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Natural Gas Pipeline Projects

Draft Environmental Impact Report/Statement

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VOLUME III

Comparisons and Recommendations

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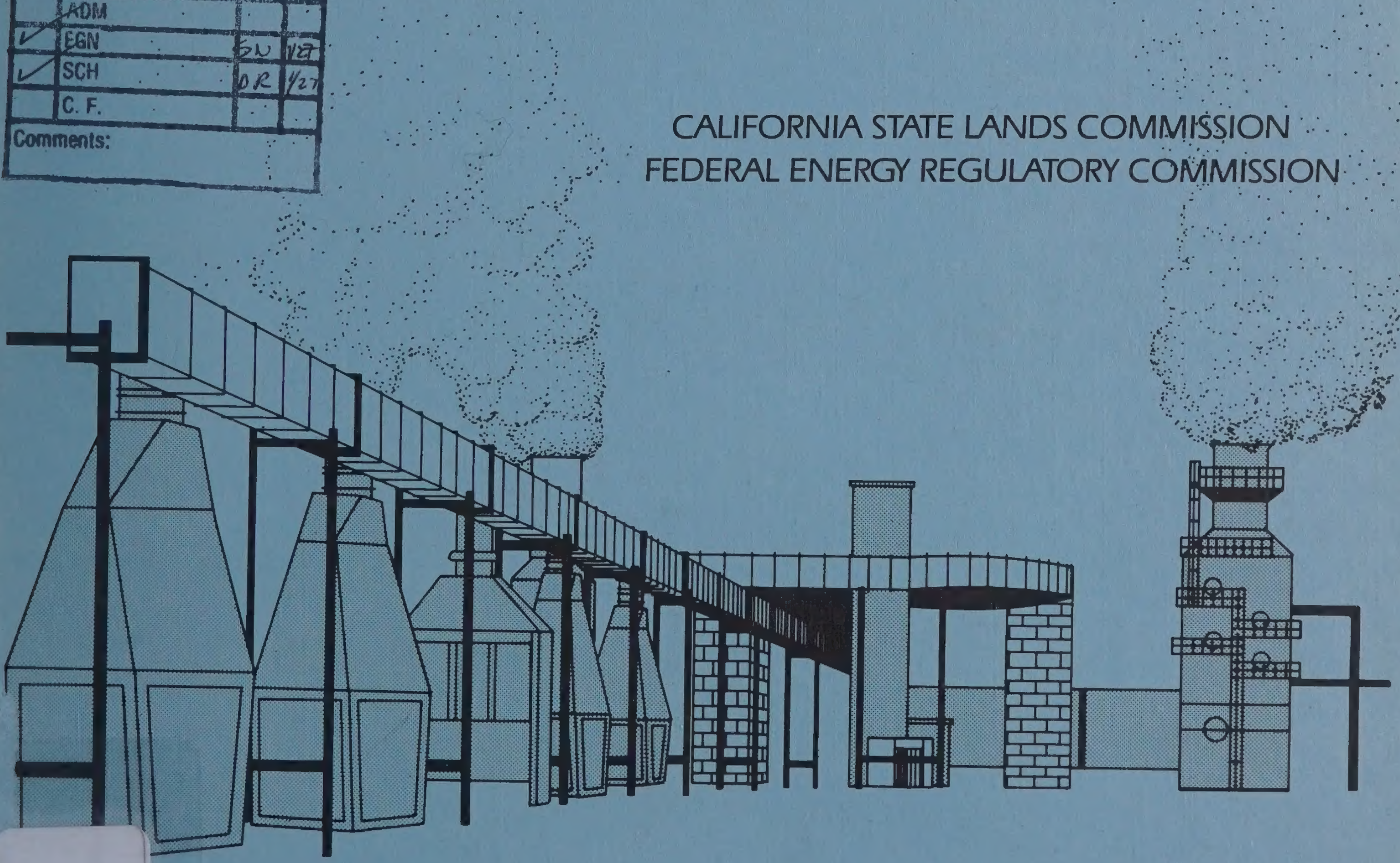

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1.0 INTERSTATE SYSTEMS COMPARATIVE ANALYSES

1.1 INTRODUCTION

This document will compare all significant and some insignificant impacts which would be created by the three major proposals. Each proposal and its alternatives/variations will be compared to determine the best case for each of the three major proposals. Once this has been done, comparisons among the best cases will be completed.

1.2 MOJAVE PROPOSED ACTION

The Mojave Pipeline Company proposes to construct an interstate natural gas pipeline from Mohave County, Arizona, to Kern County, California. The proposed Mojave system would be approximately 387 miles long. Three components make up the Mojave system: the Mojave Transfer Line in Mohave County would entail approximately 16.5 miles of new pipeline; the proposed mainline would consist of 325 miles of pipe; and the Kern Lateral would include 45 miles of pipeline in the San Joaquin Valley. Table 1.2-1 compares impacts of the Mojave Proposal and its alternatives.

In order to transport natural gas to the EOR fields in the Bakersfield area, the Mojave Pipeline Company must be supplied gas from other pipelines. Two natural gas transmission companies have proposed to supply this gas to Mojave. The El Paso Natural Gas Company and the Transwestern Pipeline Company could potentially supply the 600 MMcfd of natural gas required to meet the needs of the Mojave proposal. Utilization of these companies resulted in four major ways of delivering natural gas to the EOR market. These four systems and alternatives to these systems will be outlined below with a discussion of the major impacts for each.

1.2.1 Mojave System A: Mojave, El Paso 400 MMcfd Case (all from Texas) and Transwestern

This system is comprised of the proposed projects of each of these companies; it would entail approximately 758 miles of pipeline broken down into three components: the 387 miles of new pipeline needed for the Mojave proposal; 14.8 miles of looping of an existing line for the El Paso 400 MMcfd proposal; and approximately 356 miles of loops for the Transwestern Pipeline Company proposal. Transwestern's application states it could deliver up to 320 MMcfd; however, it is currently unknown if Mojave could transport the additional available 120 MMcfd.

Table 1.2-1

MOJAVE SUMMARY OF IMPACTS

	MOJAVE SYSTEM				MOJAVE 1/ ROUTE		
	System A 2/	System B 3/	System C 4/	System D 5/	Mojave	Alternative A	Alternative B
AIR QUALITY	NSI 6/	NSI	NSI	NSI	NSI	NSI	NSI
GEOLOGY							
Surface fault rupture	12	12	10	12	10	0 (0)	7 (7)
Miles of landslide potential	14	14	50	98	0	0 (0)	0 (0)
Miles of slope greater than 30%	69	74	44	69	25	0 (0)	2 (1)
SOIL							
Acres of poor reclamation potential	4768	4914	3477	4057	2721	230 (162)	770 (764)
SURFACE WATER							
Number of stream crossings	74	78	67	126	34	3 (3)	2 (1)
Intermittent stream crossings	71	75	64	111	31	3 (3)	1 (0)
Perennial stream crossings	3	3	3	15	3	0 (0)	1 (1)
Moderate/high significance perennial stream crossings	0	0	0	9	0	0 (0)	0 (0)
GROUNDWATER							
Miles of potential impact	134	134	96	96	56	0 (16)	4 (10)
FRESHWATER BIOLOGY							
Number of sensitive stream crossings with fish present	0	0	0	0	0	0 (0)	0 (0)
TERRESTRIAL BIOLOGY							
Vegetation							
Total acres of native vegetation temporarily disturbed	9182	9232	7294	9385	4684	280 (206)	920 (922)
Acres of woody vegetation kept cleared for the life of the project	1765	1765	1774	1774	1535	136 (103)	435 (435)
Acres of riparian habitat crossed	61	61	61	71	59	10 (1)	7 (8)

Table 1.2-1 (continued)

MOJAVE SUMMARY OF IMPACTS

	MOJAVE SYSTEM				MOJAVE 1/ ROUTE		
	System A 2/	System B 3/	System C 4/	System D 5/	Mojave	Alternative A	Alternative B
Vegetation (continued)							
Acres of federally threatened or endangered plant habitat affected	60	60	0	0	0	0 (0)	0 (0)
Number of species	1	1	0	0	0	0 (0)	0 (0)
Acres of California state listed plant habitat affected	947	947	947	947	947	0 (0)	12 (12)
Number of species	3	3	3	3	3	0 (0)	1 (1)
Acres of agricultural land temporarily disturbed	767	767	731	915	731	0 (0)	45 (45)
Wildlife							
Big game crucial or high priority habitat (acres)	748	748	448	1437	85	0 (0)	0 (0)
Big game migration corridors (acres)	121	121	121	121	121	0 (0)	0 (0)
Big game fawning/calving area (acres)	0	0	0	0	0	0 (0)	0 (0)
Upland game bird sensitive habitat (acres)	0	0	24	30	0	0 (0)	0 (0)
Waterfowl critical nesting areas (acres)	0	0	0	0	0	0 (0)	0 (0)
Raptor nesting areas (nests)	0	0	0	2	0	0 (0)	0 (0)
Acres of potential threatened or endangered animal habitat	10253	10253	10366	11284	8460	633 (502)	1284 (1236)
Yuma clapper rail	151	151	139	139	127	121 (103)	0 (0)
Bald eagle	187	187	175	187	163	121 (103)	0 (0)
Peregrine falcon	490	490	163	163	163	121 (103)	0 (0)

Table 1.2-1 (continued)

MOJAVE SUMMARY OF IMPACTS

	MOJAVE SYSTEM				MOJAVE 1/ ROUTE		
	System A 2/	System B 3/	System C 4/	System D 5/	Mojave	Alternative A	Alternative B
Wildlife (continued)							
Whooping crane	0	0	0	0	0	0 (0)	0 (0)
California condor	1694	1694	1694	1694	1694	0 (0)	0 (0)
Desert tortoise	3032	3032	3274	3274	2959	270 (193)	921 (921)
Blunt-nosed leopard lizard	520	520	520	520	520	0 (0)	0 (0)
Tehachapi slender salamander	18	18	18	18	18	0 (0)	0 (0)
San Joaquin kit fox	943	943	943	943	943	0 (0)	0 (0)
Black-footed ferret	1345	2645	1567	2473	0	0 (0)	0 (0)
Mojave ground squirrel	727	727	727	727	727	0 (0)	363 (315)
Nelson's antelope squirrel	412	412	412	412	412	0 (0)	0 (0)
Tipton kangaroo rat	24	24	24	24	24	0 (0)	0 (0)
Short-nosed kangaroo rat	410	410	410	410	410	0 (0)	0 (0)
Giant kangaroo rat	300	300	300	300	300	0 (0)	0 (0)
SOCIOECONOMICS							
Population change >10%	No	No	No	No	No	No	No
Total employment change >10%	No	No	No	No	No	No	No
Income change >10%	No	No	No	No	No	No	No
Vacancy rates of temporary housing <5%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local tax base change >10%	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 1.2-1 (continued)

MOJAVE SUMMARY OF IMPACTS

	MOJAVE SYSTEM				MOJAVE [1] ROUTE		
	System A [2]	System B [3]	System C [4]	System D [5]	Mojave	Alternative A	Alternative B
Traffic	NSI	NSI	NSI	NSI	NSI	NSI	NSI
Operational noise	NSI	NSI	NSI	NSI	NSI	NSI	NSI
Recreation (conflicts)	5	5	5	5	5	0 (1)	0 (0)
LAND USE/OWNERSHIP							
Number of conflicts	8	8	8	10	7 (1)	0 (1)	1
CULTURAL RESOURCES							
Number of sites in the direct impact zone	82	89	93	229	41	0 (0)	8 (13)
NRHP listed or eligible sites in the direct impact zone	2	2	4	7	2	0 (0)	0 (0)
Percentage of line actually surveyed	6	6	8	18	6	0 (22)	15 (1)
High sensitivity segments	7	8	8	13	3	0 (0)	2 (1)
PALEONTOLOGIC RESOURCES							
Acres of impact to significant formations	3273	3381	2725	3581	1941	0 (0)	640 (793)
VISUAL RESOURCES							
Acres of high visual impact	0	0	0	0	0	0 (0)	0 (0)

---

[1] The first entry for each resource area under alternative routing represents the value for the alternative segment only; the value in parenthesis represents the comparable quanity for the portion of the proposed route which would be avoided by using this alternative.

[2] Mojave System A: Mojave, El Paso 400 MMcfd Case (all from Texas) and Transwestern

[3] Mojave System B: Mojave, El Paso 400 MMcfd Alternative 100/300, Northwest 100 MMcfd Case, and Transwestern

[4] Mojave System C: Mojave, El Paso 600 MMcfd Alternative (100/500 Case), and Northwest 100 MMcfd Case

[5] Mojave System D: Mojave, El Paso 600 MMcfd Alternative (200/400 Case), and Northwest 200 MMcfd Case

[6] NSI = No Significant Impact

The proposed action would not significantly affect air quality concerns along the route in either construction or operation. The proposed compressor station (MJ-1) would meet all applicable state and federal regulations. The compressor station would represent a permanent fixed emission source requiring permits for construction and operation. Construction impacts to air quality would represent a temporary source of both dust and engine emissions.

This proposal would cross at least twelve potentially active surface faults. The potential for surface fault rupture would be greatest in the western portions of the route. Pipeline design should be capable of withstanding fault ruptures with adequate pipe strength and block valves in appropriate areas.

The pipeline route would contain approximately 14 miles of potential landslide areas. The majority of the potential landslide areas would occur along the Transwestern route. In addition to the miles of landslide potential, 69 miles of the route would be constructed in areas with a slope of greater than 30 percent. These areas are concentrated along the Transwestern line and in the Tehachapi Mountains portion of the Mojave line.

Approximately 4,768 acres of the route would occur in areas with soils having a poor reclamation potential. These areas would occur along all three routes. The limiting factor on soils involves both wind and water erosion. The main limiting factor on revegetation of these soils, however, is a lack of precipitation. Based on the climatic regime of the pipeline routes, the potential for stabilizing these soils would be low and would certainly take more than five years.

The route would cross 74 intermittent and perennial streams; Three perennial stream crossings would be necessary.

There would be approximately 134 miles of potential impacts to groundwater resources. It is unlikely that impacts to groundwater would be significant if the proper mitigation measures were taken during construction. Construction mitigation measures with regard to groundwater should concern the prevention of spills during the fueling and maintenance of construction equipment, and avoidance of adverse effects on springs.

The Mojave proposal would have no impacts to freshwater biology since no sensitive stream crossings were identified.

Although it would temporarily disturb 9,182 acres of native vegetation, the proposed route would not cross unique or extremely sensitive vegetation types except for Joshua trees and cactus which are scattered in the creosote bush and saltbush vegetation types. The route would keep 1,765 acres of woody vegetation, primarily creosote bush, cleared from the operational ROW for the life of the project. Due to the low revegetative potential along the pipeline route, revegetation of the woody

plant species may not occur for well over 50 years. Construction of the route would also impact approximately 61 acres of riparian habitat. These habitats, however, should recover quickly.

The proposed route has the potential to impact one federally threatened plant species and its habitat. This would represent approximately 60 acres of federally listed plant species habitat located along the Transwestern route. Three California state listed plant species would be impacted. This plant habitat could occur along 947 acres of the Mojave route.

In addition to the impacts to native vegetation discussed above, the proposed route would temporarily disturb 767 acres of agricultural land, primarily along the Mojave route. Impact would not last over one agricultural season. The proposed route would also permanently remove 158 acres of vineyards and orchards from production.

The proposed Mojave System A route would cross 748 acres of big game high priority/critical habitat and 121 acres of big game migration corridors. The route would impact no upland game bird sensitive habitat and no raptor nesting areas.

The proposed route would also impact 10,253 acres of habitat of wildlife species of special concern. Table 1.2-1 lists the acres of impacts for individual species. Significantly impacted species habitat would include California condor, desert tortoise, blunt-nosed leopard lizard, San Joaquin kit fox, black-footed ferret, and Mojave ground squirrel. Habitat disturbance to each of these species would all be in excess of 500 acres.

The construction workforce of the proposed route would place a significant but temporary demand on housing and campgrounds in portions of Arizona, New Mexico, and in San Bernardino County, California. This would inconvenience travelers and campers seeking accommodations if construction occurred during tourist seasons. Property tax revenues would increase more than 10 percent in five counties crossed by the pipeline, a significant positive impact.

The proposed route would have no significant impacts to traffic since major roads along the route would be crossed by directionally drilling beneath them. Noise impacts caused by construction would be of a temporary nature and would only occur during working hours. Since the majority of the proposed route occurs in relatively uninhabited areas, noise resulting from construction would not present a problem. Noise resulting from compressor station operation would be monitored and should be below the 55 dBA level used by FERC as being potentially significant. The compressor station would be located in a low population area and noise levels would not exceed 50 dBA outside of the fenced boundary of the compressor station.

The proposed route would conflict with the operation of five recreation areas. These impacts would generally be temporary in nature but could produce significant impacts to the Parker 400 ORV race route. Other significant impacts could occur along the Pacific Crest National Scenic Trail, Tehachapi Mountain Park, and Kern River County Park with interruption of traffic and disturbance of vegetation, soils, park facilities, and the natural visual scene.

The remaining impacts to recreation facilities would involve traffic delays and noise around parks and increased usage of park facilities by construction workers. These impacts would be temporary and not significant.

Major, probably permanent, visual impact would be experienced at the Tehachapi Mountain Park and the Kern River County Park. Significant temporary impact would include severe traffic disruption and noise.

The proposed route would conflict with zoning regulations around the Golden Shores Subdivision along the Mojave Transfer Line. The Transfer Line would also conflict with the land use of the Havasu National Wildlife Refuge. The route would be outside of the BLM California Desert Conservation Area utility corridor between Pisgah and Boron in San Bernardino County. The BLM policy is to follow the corridor whenever possible. The route has the potential to conflict with the land use plans of Edwards Air Force Base in Kern County. Conflict exists in the Stallion Springs Community.

Transwestern Loop G would not be in conformance with the Coconino National Forest Plan. This conflict could be easily resolved by keeping Loop G north of the existing line in the vicinity of the Fort Valley Experimental Forest.

The System A route contains seven 25-mile segments which have a high cultural resources sensitivity rating. This sensitivity rating is based on estimated site density within the analysis corridor as determined by previous surveys, both the presence of State and National Register properties, the crossing of Indian reservation lands, and terrain analysis, e.g., presence of major water sources (see Cultural Resources Technical Report for more details). Compliance procedures should provide adequate mitigation of potential significant impacts.

Approximately 3,273 acres of significant paleontological formations would be crossed by the proposed route. Since this figure indicates potentially significant areas, it is difficult to determine the exact amount of significant formations. If adequate mitigation measures are implemented, the potential impacts to paleontological resources should be insignificant.

No areas with potentially high visual impact have been identified. This is primarily due to the nature of the proposed

The proposed route would conflict with the operation of five recreation areas. These impacts would generally be temporary in nature but would produce significant impacts to the Parker 400 ORV race route. Other significant impacts could occur along the Pacific Crest National Scenic Trail, Tehachapi Mountain Park, and Kern River County Park with interruption of traffic and disturbance of vegetation, soils, park facilities, and the natural visual scene.

The remaining impacts to recreation facilities would involve traffic delays and noise around parks and increased usage of park facilities by construction workers. These impacts would be temporary and not significant.

Major, probably permanent, visual impact would be experienced at the Tehachapi Mountain Park and the Kern River County Park; significant temporary impact would include severe traffic disruption and noise.

The proposed route would conflict with zoning regulations around the Golden Shores Subdivision along the Mojave Transfer Line. The Transfer Line would also conflict with the land use of the Havasu National Wildlife Refuge. The route would be outside of the BLM California Desert Conservation Area utility corridor between Pisgah and Merco in San Bernardino County. The BLM policy is to follow the corridor whenever possible. The route has the potential to conflict with the land use plans of Edwards Air Force Base in Kern County. Conflict exists in the Stallion Springs Community.

Transwestern Loop G would not be in conformance with the Coconino National Forest Plan. This conflict could be easily resolved by keeping Loop G north of the existing line in the vicinity of the Fort Valley Experimental Forest.

The System A route contains seven 25-mile segments which have a high cultural resources sensitivity rating. This sensitivity rating is based on estimated site density within the analysis corridor as determined by previous surveys, both the presence of State and National Register properties, the crossing of Indian reservation lands, and terrain analysis, e.g., presence of major water sources (see Cultural Resources Technical Report for more details). Compliance procedures should provide adequate mitigation of potential significant impacts.

Approximately 3,272 acres of significant paleontological formations would be crossed by the proposed route. Since this figure indicates potentially significant areas, it is difficult to determine the exact amount of significant formations. If adequate mitigation measures are implemented, the potential impacts on paleontological resources should be insignificant.

No areas with potentially high visual impact have been identified. This is primarily due to the nature of the proposed action since all but 387 miles would consist of looping existing pipeline. The new construction along the Mojave route in the Mojave Desert would primarily occur adjacent to existing pipelines and thus would not constitute a visual intrusion.

1.2.2 Mojave System B: Mojave, El Paso 400 MMcfd Alternative 100/300, Northwest 100 MMcfd Case, and Transwestern

The four-component System B alternative would entail approximately 781 miles of pipeline. The Mojave and Transwestern portions of the route would remain the same as those discussed in Section 1.2.1. Under this proposed alternative El Paso would require 29.4 miles of looping (three loops) and 3,580 hp of compression. Northwest would deliver 100 MMcfd to El Paso at the Bondad Compressor Station. This proposal would require only 8.1 miles of expansion looping on Northwest's line. These miles would occur on the Muddy Creek Loop in southwestern Wyoming, beginning at the Muddy Creek Compressor Station. The looping would consist of 24-inch O.D. pipe.

This alternative would still supply 720 MMcfd of natural gas to the Mojave Pipeline Company at Topock, Arizona.

This alternative action would not significantly affect air quality concerns along the route for either construction or operation. Three new compressor stations would be added, one at Topock as proposed for System A, the Cisco and Cahone stations for Northwest, as well as the additional compression at the Bondad station. These stations would meet all state and federal regulations.

This alternative proposal would encounter at least twelve potentially active faults, the same as discussed for System A in Section 1.2.1. The potential for surface fault rupture would be greatest in the western portions of the Mojave route. Adequate pipeline design criteria should mitigate hazards associated with the faults.

The alternative would contain approximately 14 miles of potential landslide areas, again the same as for the System A route. The majority of the landslide potential would occur on the Transwestern route and the Tehachapi Mountains portions of the Mojave route. Approximately 74 miles of the route would be built in areas with slopes of greater than 30 percent. This is five more miles of potentially unstable areas on the Transwestern and Mojave lines.

Approximately 4,914 acres of the route would occur in areas with soils having a poor reclamation potential. This represents 146 fewer acres with poor reclamation potential for with the System A route. The limiting factor on soils again is the lack of precipitation in the region.

This route would cross 78 intermittent and perennial streams; four more than the previously discussed route. A total of three perennial stream crossings would be necessary, the same as discussed for System A. None of the perennial stream crossings have a moderate or high significance rating.

The potential for impact to groundwater resources could occur along 134 miles of the route the same as discussed above. Adequate mitigation measures should virtually eliminate the potential for impact.

As with the routing discussed above, there would be no impacts to freshwater biology.

System B would temporarily disturb 9,232 acres of native vegetation and like the System A proposal would not cross unique or extremely sensitive vegetation types except for Joshua trees and cactus which are scattered in the creosote bush and saltbush vegetation types. This routing would result in 50 more acres of temporary disturbance to native vegetation types.

The route would keep 1,765 acres of woody vegetation, primarily creosote bush and other shrubby species, cleared from the operational ROW for the life of the project. This represents the same number of acres of permanent disturbance as was discussed above for System A. The construction of the route would affect approximately 61 acres of riparian habitat, similar to that discussed in Section 1.2.1.

This route has the potential to impact one federally threatened plant species and its habitat, the same as the System A route. This would represent approximately 60 acres of federally listed plant species habitat, the same as System A. Three California state listed plant species would be impacted. These plant habitats could occur along 947 acres of the Mojave route, the same as those discussed for System A.

This routing would temporarily disturb 767 acres of agricultural land, the same as for the route discussed above. This route would also permanently remove the same number of acres of orchards and vineyards from production.

System B would cross 748 acres of big game high priority/critical habitat and 121 acres of big game migration corridors. The crossing of critical habitat and migration corridors would be the same as would occur on the System A route. The System B route would impact no upland game bird sensitive habitat and would not impact any raptor nesting areas.

The System B route would impact 10,253 acres of habitat of wildlife species of special concern, the same as System A. Significantly impacted species habitat would include California condor, desert tortoise, blunt-nosed leopard lizard, San Joaquin kit fox, black-footed ferret, and Mojave ground squirrel. Table

1.2-1 shows the direct comparisons on all wildlife species of special concern.

The construction workforce would place a significant but temporary demand on housing and campgrounds in the Wyoming, Arizona, New Mexico, and San Bernardino County areas. Property tax revenues would increase more than 10 percent in five counties crossed by the pipelines.

As with System A, this alternative would have no significant impacts on traffic. Noise levels would be similar to those discussed above; however, since three new compressor stations would be required along with the additional compression required at Bondad, this route would create more permanent noise.

This route would have similar impacts to recreation areas and land use as those discussed for System A.

The System B route contains eight 25-mile segments having a high cultural resources sensitivity rating, one more than System A. Archaeological compliance procedures, however, should mitigate the potential significant impacts.

Approximately 3,381 acres of significant paleontological formations would be crossed by this route. This would be 108 more acres than the System A route.

No areas of potentially high visual impact have been identified for either System A or System B.

1.2.3 Mojave System C: Mojave, El Paso 600 MMcfd Alternative, (100/500 Case) and Northwest 100 MMcfd Case

This three-component proposal would entail approximately 591 miles of pipeline construction. The Mojave proposal under this scenario would not require the Mojave Transfer Line since all of the gas required to supply Mojave would come from the El Paso line. The El Paso 600 MMcfd Alternative (100/500 Case) would require 211.9 miles of looping of an existing El Paso line running from the Bondad Compressor Station in La Plata County, Colorado, to Topock in Mohave County, Arizona. This would be accomplished by constructing thirteen separate loops of primarily 34-inch O.D. pipe.

The 100/500 Case would receive 100 MMcfd of natural gas from Northwest. The Northwest facilities would remain unchanged from those discussed for System B.

System C could supply 600 MMcfd of natural gas to the Mojave Pipeline Company receipt point at Topock. It would provide the exact amount of gas that Mojave has proposed to carry in its application.

This alternative would not significantly affect air quality along the route in either construction on operation. The three new compressor stations and additional compression at four other stations would meet all applicable state and federal air quality regulations. Air quality concerns, therefore, would be similar to those for System B.

This alternative would encounter at least ten potentially active surface faults, two fewer than for either Systems A or B. Design criteria should be addressed to minimize the effects of fault rupture. All of these are on the Mojave mainline and laterals.

This route would contain approximately 50 miles of potential landslide areas. These 50 miles represent a 36-mile increase over those discussed in Systems A and B. In addition to the miles of landslide potential, 44 miles of the route would be constructed in areas with a slope greater than 30 percent. This would be 25 and 30 fewer miles than those identified for the System A and B routes respectively.

Approximately 3,477 acres along the proposed route would occur in areas with soils having poor reclamation potential. These areas would occur primarily along the Mojave and El Paso routes. This acreage is 1,291 fewer than for the proposal discussed for System A, and 1,437 fewer acres than identified for System B. Again reclamation potential is primarily tied to precipitation and thus the Mojave and El Paso routes account for most of these acres.

This route would cross 67 intermittent and perennial streams; seven fewer than for System A and 11 fewer than for System B. It would cross three perennial streams, unchanged from the proposals discussed above. None of these stream crossings would have moderate to high significance, the same as identified for both Systems A and B.

Approximately 96 miles of groundwater resources could be adversely affected. This represents 38 fewer miles than for Systems A or B. Again, adequate mitigation measures, particularly oriented toward preventing refueling spills, should mitigate the affects to groundwater.

This system, like the other two, would have no significant impacts to freshwater biological resources.

System C would temporarily disturb 7,294 acres of native vegetation, 1,888 and 1,938 fewer acres than for Systems A and B, respectively. No unique or extremely sensitive vegetation types except for Joshua trees and cactus would be crossed. This route would keep 1,774 acres of woody vegetation cleared from the operational ROW for the life of the project. This is nine more acres than were identified for the System A and B routes. Construction of this route would impact approximately 61 acres of riparian habitat, the same as for Systems A and B.

This route would not impact any federally threatened or endangered plant species, one fewer than either the System A or B routes. No acres of federally threatened or endangered plant species habitat would be impacted, 60 fewer than either System A or B. Three California state listed plant species would be impacted. This plant habitat could occur along 947 acres of the Mojave route and would not represent any increase or decrease over the two previously discussed proposals.

This route would also temporarily disturb 731 acres of agricultural land, 36 fewer than either System A or B. Again, these impacts would not last over one agricultural season. The route would permanently remove 158 acres of orchards and vineyards from production.

The Mojave System C route would impact 448 acres of big game high priority/critical habitat. This is 300 fewer than either the System A or B routes. The impacts to big game migration corridors would remain unchanged. Impacts to upland game bird sensitive habitat would be 24 acres, as opposed to no impacts for either the System A or B route. The route would not impact any raptor nests, unchanged from the System A and B routes.

The proposed route would also impact 10,366 acres of wildlife habitat of species of special concern. This represents an increase of 113 acres over Systems A and B. This increase would occur only in the habitat of the desert tortoise only. Significantly impacted species habitat would include the California condor, desert tortoise, blunt-nosed leopard lizard, San Joaquin kit fox, black-footed ferret, and Mojave ground squirrel.

The construction workforce of the proposed route would place a significant but temporary demand on housing and campgrounds in southwestern Wyoming, and portions of Arizona, New Mexico and San Bernardino County in California. This impact would remain essentially the same as those discussed above, although impacts in Arizona and New Mexico may not be as severe since both El Paso and Transwestern workforces would not be in the area simultaneously. Property tax revenues would increase more than 10 percent in only one county crossed by the pipeline.

Traffic and noise impacts would remain similar to those discussed for System B. Impacts to recreational facilities would also remain similar from those discussed for Systems A and B.

Although the proposed route would not conflict with zoning regulations around the Golden Shores Subdivision since the Mojave Transfer Line would not be needed, the last 11 miles of the El Paso Hackberry Loop has been zoned residential. The westernmost 4.2 miles of the Flagstaff Loop of the El Paso alternative would be in conflict with the Coconino National Forest's Elden Environmental Study Area. The remainder of the land use problems would remain the same as those discussed for both the System A and B routes. The conflicts associated with the Transwestern line

concerning the Coconino National Forest Plan would not be present.

System C contains eight 25-mile segments with a high cultural resources sensitivity rating, one more sensitive segment than System A and the same number of sensitive segments as System B. Compliance procedures should provide adequate mitigation to potentially significant impacts caused by construction.

System C could impact 2,725 acres of significant paleontological formations. This represents 548 fewer than for System A and 657 fewer than for System B.

No significant high visual impacts have been identified along this routing proposal.

1.2.4 Mojave System D: Mojave, El Paso 600 MMcfd Alternative (200/400 Case), and Northwest 200 MMcfd Case

This three-component proposal would entail approximately 757 miles of pipeline construction. The Mojave proposal under this scenario would not require the Mojave Transfer Line since all of the gas required to supply Mojave would come from the El Paso line. The El Paso 600 MMcfd Alternative (200/400 Case) would require 223.7 miles of looping of an existing El Paso line running from the Bondad Compressor Station in La Plata County, Colorado, to Topock in Mohave County, Arizona. This would be accomplished by constructing 13 separate loops of primarily 34-inch O.D. pipe.

Northwest would transport 200 MMcfd down their Sumas, Washington to Ignacio, Colorado, line. This gas delivery would require facility expansions between the Muddy Creek Compressor Station in Wyoming to Ignacio, Colorado. These expansions would consist of 162 miles of looping in seven sections as well as construction of two new compressor stations. The looping would consist of 24-inch O.D. pipe.

System D could supply 600 MMcfd of natural gas to the Mojave Pipeline Company receipt point at Topock. It would provide the exact amount of gas that Mojave has proposed in its application.

This proposed action would not significantly affect air quality along the route for either construction on operation. The three new compressor stations and additional compression at four others would meet all applicable state and federal air quality regulations. Air quality concerns, therefore, would be similar to those discussed for System C.

System D would encounter at least 12 potentially active surface faults, the same as both Systems A or B and two more than System C. Again, design criteria should be addressed to minimize the effects of fault rupture.

This route would contain approximately 98 miles of potential landslide areas. The majority of the landslide areas would occur along the Northwest route particularly in the vicinity of Rangely Loops A and B. These 98 miles represent a 84-mile increase over those discussed in Systems A and B, and a 48-mile increase over System C. In addition to the miles of landslide potential, 69 miles of the route would be constructed in areas with a slope greater than 30 percent. This would be the same as for System A, five fewer miles than those identified for System B, and 25 more miles than those identified for System C.

Approximately 4,057 acres along the proposed route would occur in areas with soils having poor reclamation potential. These areas would occur primarily along the Mojave and El Paso routes. This acreage is 711 and 857 fewer than for Systems A and B respectively and 580 more than for System C. Again reclamation potential is primarily tied to precipitation and thus the Mojave and El Paso routes account for most of these acres.

This route would cross 126 intermittent and perennial streams, of which 15 are perennial. Nine of these stream crossings would have moderate to high significance with all of the significant crossings occurring on the Northwest line. This would be 52, 48, and 59 more perennial and intermittent stream crossings than Systems A, B, and C, respectively, 12 more perennial stream crossings than Systems A, B, and C, and nine more moderate to high significance stream crossings than Systems A, B, or C.

Approximately 96 miles of groundwater resources could be adversely affected. This represents 38 fewer miles than those identified for Systems A and B, respectively, and the same as were identified for System C. Again, adequate mitigation measures, particularly geared toward preventing refueling spills and disruption of springs should mitigate the effects to groundwater.

This proposal, like the other three, would have no significant impacts to freshwater biological resources.

System D would temporarily disturb 9,385 acres of native vegetation, 203, 153, and 2,091 more than identified for Systems A, B, and C, respectively. No unique or extremely sensitive vegetation types except for Joshua trees and cactus would be crossed. This route would keep 1,774 acres of woody vegetation cleared from the operational ROW for the life of the project. This is nine fewer than for the System A and B routes, and the same as would be disturbed by the System C route. Construction of this route would impact approximately 71 acres of riparian habitat, ten more acres of disturbance than would occur on Systems A, B, or C.

This route would not impact any federally threatened or endangered plant species, one less than for the System A or B

routes and the same as the System C route. No federally threatened or endangered plant species habitat could be impacted, 60 acres fewer than Systems A or B and the same as for System C. Three California state listed plant species would be impacted. This plant habitat could occur along 947 acres of the Mojave route and would not represent any increase or decrease over the three previously discussed proposals.

This route would also temporarily disturb 915 acres of agricultural land, 148 more than Systems A or B and 184 more than discussed for System C. Again, these impacts would not last over one agricultural season. The route would permanently remove 158 acres of orchards and vineyards from production, unchanged from the proposals discussed above.

The Mojave System D route would impact 1,437 acres of big game high priority/critical habitat. This is 689 more than the System A and B routes and 989 more than the System C route. The impacts to big game migration corridors would remain unchanged. Impacts to upland game bird sensitive habitat would be 30 acres more than either System A or B, and six more acres than the System C route. The proposed route would also impact two raptor nests, as opposed to no impacts for Systems A, B, or C.

The route would also impact 11,284 acres of wildlife habitat of species of special concern. This represents an increase of 1,031 acres over Systems A and B, and a 918-acre increase over System C. These increases would occur for the habitats of the peregrine falcon, desert tortoise and black-footed ferret. Significantly impacted species habitat would include the California condor, desert tortoise, blunt-nosed leopard lizard, San Joaquin kit fox, black-footed ferret, and Mojave ground squirrel.

The construction workforce of System D would place a significant but temporary demand on housing and campgrounds in areas of Wyoming, Colorado, Utah, portions of Arizona and New Mexico, and San Bernardino County in California. This impact would remain essentially the same as that discussed for System C. Property tax revenues would increase more than 10 percent in three counties crossed by the pipeline.

Traffic and noise impacts would remain essentially unchanged from those discussed for System C. Impacts to recreational facilities would also remain essentially unchanged from those discussed for System B.

Although System D would not conflict with zoning regulations around the Golden Shores Subdivision since the Mojave Transfer Line would not be needed, the last 11 miles of the El Paso Hackberry Loop has been zoned residential. The westernmost 4.2 miles of the Flagstaff Loop of the El Paso 200/400 Alternative would be in conflict with the Coconino National Forest's Elden Environmental Study Area. Other potential land use conflicts could occur along the Northwest route in the vicinity of Moab, routes and the same as the System C route. No federally threatened or endangered plant species habitat would be impacted. 50 acres fewer than Systems A or B and the same as for System C. Three California state listed plant species would be impacted. This plant habitat would occur along 440 acres of the Mojave route and would not represent any increase or decrease over the three previously discussed proposals.

This route would also temporarily disturb 725 acres of agricultural land, 155 more than Systems A or B and 161 more than discussed for System C. Again, these impacts would not last over one agricultural season. The route would permanently remove 125 acres of orchards and vineyards from production, unchanged from the proposals discussed above.

The Mojave system D route would impact 1,455 acres of big game high priority/critical habitat. This is 909 more than the System A and B routes and 989 more than the System C route. The impacts to big game migration corridors would remain unchanged. Impacts to upland game bird sensitive habitat would be 17 acres more than either System A or B, and six more acres than the System C route. The proposed route would also impact two raptor nests, as opposed to no impacts for Systems A, B, or C.

The route would also impact 11,360 acres of wildlife habitat of species of special concern. This represents an increase of 1,735 acres over Systems A and B, and a 715-acre increase over System C. These increases would occur for the habitats of the peregrine falcon, desert tortoise and black-footed ferret. Significantly impacted species habitat would include the California condor, desert tortoise, blunt-nosed leopard lizard, San Joaquin kit fox, black-footed ferret, and Mohave ground squirrel.

The construction workforce of System D would place a significant but temporary demand on housing and campgrounds in areas of Wyoming, Colorado, Utah, portions of Arizona and New Mexico, and San Bernardino County in California. This impact would remain essentially the same as that discussed for System C. Property tax revenues would increase more than 10 percent in three counties crossed by the pipeline.

Traffic and noise impacts would remain essentially unchanged from those discussed for System C. Impacts to recreational facilities would also remain essentially unchanged from those discussed for System C.

Although System D would not conflict with zoning regulations around the Golden Shores Subdivision since the Mojave Pipeline line would not be needed, the last 13 miles of the El Paso Hackberry loop has been zoned residentially. The westernmost 4.7 miles of the Flagstaff loop of the El Paso 750/850 Alternative would be in conflict with the Coconino National Forest's Elden Environmental Study Area. Other potential land use conflicts could occur along the Northwest route in the vicinity of Moab, Utah, where the first 1.5 miles of the Moab Loop would be within substantial residential and commercial development and east of Arches National Park, where the Cisco Loop would be adjacent to the Lost Springs WSA. The remainder of the land use problems would remain the same as those discussed for Systems A, B, and C. The conflicts associated with the Transwestern line concerning the Coconino National Forest Plan would not be present.

System D contains three 25-mile segments with a very high cultural resources sensitivity rating and ten 25-mile segments with a high sensitivity rating. This represents a significant increase over any of the systems previously discussed. Compliance procedures should provide adequate mitigation to potential significant impacts caused by construction.

System D could impact 3,581 acres of significant paleontological formations. This represents 308, 200, and 856 more than Systems A, B, and C, respectively.

The only significant visual impacts identified along this routing proposal would be associated with Arches National Park and the adjacent WSA. Construction at the southwestern end of the Cisco Loop would be visible from both areas.

1.2.5 Mojave Alternative A

Alternative A (Map 1, sheets 11-12) is an alternative to the proposed Mojave Transfer Line. It would follow a BLM utility corridor which is an existing transmission line and an Interstate 40/BLM utility corridor along an existing El Paso ROW in Mohave County, Arizona.

Alternative A would entail construction of 23 miles of pipeline compared with the 16.5 miles of construction necessary for the Mojave Transfer Line.

Impacts to air quality and geology would remain unchanged from those for the Mojave Transfer Line.

The Mojave Alternative A route would include 230 acres of area with soils with a poor reclamation potential compared to 162 acres for the Mojave Transfer Line.

Surface water and freshwater biology impacts would remain unchanged from those for the Mojave Transfer Line.

There is little potential for groundwater impacts along Alternative A.

The Alternative A route would temporarily disturb 280 acres native vegetation compared with 206 for the Mojave Transfer Line. Alternative A would keep 136 acres of woody vegetation cleared from the operational ROW for the life of the project while the

Mojave Transfer Line would keep 103 acres of woody vegetation permanently cleared for the life of the project. Alternative A route would impact approximately 10 acres of riparian habitat compared with only one acre on the Mojave Transfer Line.

Neither Alternative A nor the Mojave Transfer Line routes would involve impact to federally listed plant species and its habitat.

The Alternative A route would involve no change in the effect of the project on the number of acres of big game high priority/ critical habitat, big game migration corridors, upland game bird sensitive habitat, and raptor nesting areas.

The Alternative A route would have 633 acres of impact to the wildlife habitat of species of special concern as opposed to 502 acres for the Mojave Transfer Line. These increased impacts would be confined to the Yuma clapper rail, bald eagle, peregrine falcon, and desert tortoise.

Socioeconomic, noise, and recreation impacts along Alternative A would remain similar to those discussed for the Mojave Transfer Line. Traffic impact would be less for Alternative A.

Alternative A would have fewer land use conflicts. The location of Alternative A would resolve the zoning problems around the Golden Shores Subdivision and would eliminate the potential for impact to the Fort Mojave Indian Reservation and reduce the potential for impact to the Havasu National Wildlife Refuge.

No changes in the number or kinds of impacts concerning cultural, paleontological, or visual resources were identified along the Alternative A route when compared to the Mojave Transfer Line.

1.2.6 Mojave Alternative B

Alternative B (Map 1, sheets 13-14) follows BLM-designated utility planning corridor G/All American Pipeline ROW between Pisgah and Boron, California. It departs from the proposed Mojave mainline route at about MP 115 and ties back in near MP 191.

Alternative B would entail the same amount of pipeline construction (76 miles) as the replaced portion of the Mojave Mainline.

Alternative B would not cause additional impacts to air quality. Except for a one mile increase of slope greater than 30 percent, Alternative B would have the same geological impact as the replaced portion of the Mojave Mainline.

Alternative B would have 770 acres of impacts to soils with poor reclamation potential compared with 764 acres for the replaced portion of the line.

Mojave Transfer Line would have 101 acres of woody vegetation permanently cleared for the life of the project. Alternative A route would impact approximately 10 acres of riparian habitat compared with only one acre on the Mojave Transfer Line.

Neither Alternative A nor the Mojave Transfer Line routes would involve impacts to federally listed plant species and its habitat.

The Alternative A route would involve no change in the effect of the project on the number of acres of big game high priority critical habitat, big game migration corridors, upland game bird sensitive habitat, and raptor nesting areas.

The Alternative A route would have 623 acres of impact to the wildlife habitat of species of special concern as opposed to 592 acres for the Mojave Transfer Line. These increased impacts would be confined to the Yuma clapper rail, bald eagle, peregrine falcon, and desert tortoise.

Socioeconomic, noise, and recreation impacts along Alternative A would remain similar to those discussed for the Mojave Transfer Line. Traffic impact would be less for Alternative A.

Alternative A would have fewer land use conflicts. The location of Alternative A would remove the zoning problems around the Golden Shores Subdivision and would eliminate the potential for impact to the Fort Mojave Indian Reservation and reduce the potential for impact to the Havasu National Wildlife Refuge.

No changes in the number or kinds of impacts concerning cultural, paleontological, or visual resources were identified along the Alternative A route when compared to the Mojave Transfer Line.

1.2.6 Mojave Alternative B

Alternative B (Map 1, Sheets 13-15) follows BLM-designated utility planning corridor D/All American Pipeline ROW between Hinkley and Boron, California. It departs from the proposed Mojave mainline route at about MP 119 and ties back in near MP 151.

Alternative B would entail the same amount of pipeline construction (76 miles) as the replaced portion of the Mojave Mainline.

Alternative B would not cause additional impacts to air quality. Except for a one mile increase of slope greater than 20 percent, Alternative B would have the same geological impact as the replaced portion of the Mojave Mainline.

Alternative B would have 770 acres of impacts to soils with poor reclamation potential compared with 744 acres for the replaced portion of the line.

Impacts to surface water with regard to stream crossings would increase by one. This would occur in intermittent stream crossings and would not be significant.

Groundwater impacts along Alternative B could be four miles more than the replaced portion of the route because it crosses more of the bottomland along the Mojave River.

No change in impacts to freshwater biology would occur.

Since Alternative B is essentially the same length as the replaced portion of the mainline and since it traverses similar vegetative types, there are no differences in the total number of acres of native vegetation temporarily disturbed, acres of woody vegetation kept cleared for the life of the project, acres of riparian habitat crossed, acres of agricultural land temporarily disturbed, or the number of federally threatened or endangered plant species or California state listed plant species affected.

The Mojave Alternative B route would cause no different impact to general wildlife concerns than the proposed action (see Table 1.2-1).

The Alternative B route would cause 1284 acres impact to the habitat of wildlife species of special concern compared with 1236 acres of impact to the replaced portion of the mainline. This increase in impacts would occur only in the habitat of the Mojave ground squirrel, where Alternative B would impact 363 acres of habitat as opposed to 315 acres of disturbance associated with the mainline portion of the route.

Impacts to socioeconomics including permanent noise and recreation would remain unchanged for the Alternative B route. Traffic impacts would be more extensive but insignificant.

One land use conflict would be resolved by utilizing Alternative B. Alternative B is entirely within an existing utility corridor across BLM lands in California. Utilizing the utility corridor, however, may involve additional conflicts with residential areas in Daggett, Barstow, and Boron.

Two 25-mile segments having high cultural resources sensitivity ratings are found along Alternative B, one more than would be found along the replaced portion of the mainline.

Significant paleontological resources would occur within 640 acres along Alternative B; the Mojave mainline portion it would replace contains 793 acres of significant formations.

The Alternative B route contains no areas of high visual significance and thus remains unchanged from the mainline.

1.2.7 The Mojave Proposal Best Case

The environmentally preferable Mojave System is System C described in Section 1.2.3 using Alternative B as described below. This decision was made by comparing the data listed in Table 1.2-1 and deciding which of the Mojave Systems and Alternatives would have the least impact to the physical and social environment.

Based on the discussions above, the combination of Mojave's proposed and alternative route with the least environmental impact is the Mojave Transfer Line and Alternative B. The U.S. Fish and Wildlife Service (FWS) has expressed opposition to the Mojave Transfer Line because two portions of it, totaling under three miles in length, are within the boundaries of the Havasu National Wildlife Refuge. The FWS favors the use of Alternative A. The extra distance and cost of the Alternative A route is not warranted by the minimal environmental effects which would occur in the refuge. No wetland areas would be affected by the Mojave Transfer Line, since all of the route is on the opposite side of Highway 95 from the body of the refuge, and all of the route is immediately adjacent to existing El Paso pipelines, some of which have been installed within the last two to three years. In addition, the Alternative A route would potentially affect more habitat for the Yuma clapper rail, the peregrine falcon and the bald eagle. With the exception of avoiding the fringes of the NWR, minor portions of the Fort Mojave Indian Reservation and the Golden Shores Subdivision, and the lower potential for impact to groundwater, all other environmental aspects of Alternative A are similar or worse than the proposal. In addition, it is seven miles longer and would cost about $2,800,000 more than the proposal, an increase of about 40 percent. In addition, it should be understood that the mainline also crosses the refuge, as must any project involving a crossing of the Colorado River. Recognizing that there is a difference of opinion concerning the routing of the Mojave Transfer Line through the refuge, the writers are requesting specific additional comments from other interested persons/organizations with respect to the expected impacts of both routes.

Alternative B would be completely within a designated utility corridor. Although it would be closer to residential areas than the proposed route, it should have no significant effect on existing residences beyond the construction period. Most of the route near Barstow is within floodplain areas of the Mojave River where development is unlikely to occur. Near Daggett the route would be adjacent to Interstate 40 where development is unlikely; moreover, it would be immediately adjacent to PG&E's existing pipeline and would therefore constitute no new impediment to development. No development currently exists along either Alternative B or the proposed route near Boron. For this reason the relative impact of the alternative and the proposed route is the same.

The air quality impacts for all of the systems would be similar.

Impacts to geology would be quite different along the four systems. The System C route would only cross ten potential surface fault rupture areas, two fewer than either the System A B, or D. In addition, only 44 miles of areas with slopes greater than 30 percent would be crossed. This is significantly lower than either the System A, B, or D routes. Finally, although the System C route would affect more miles of route with potential landslide and slope stability problems, the areas would generally occur in arid regions of New Mexico and Arizona rather than in the mountainous portions of the Rocky Mountains in Colorado which would occur along the System D route. Based on these findings, impact to geology would be less on the System C route.

Impacts to soils would occur along all routes; however, since the System C route represents the fewest miles of construction and yet generally crosses the same types of soils as the other systems, it would have the fewest acres with poor reclamation potential.

Surface water impacts would be quite different along the four system routes. The most pertinent categories in Table 1.2-1 would be perennial stream crossings and moderate/high significance stream crossings. Using these two categories, the Systems A, B, and C would have less impact to surface water, and substantially less than System D.

Possible impacts to groundwater vary between 96 and 134 miles among the four routes. This is based primarily upon the miles of construction within the areas where there is a moderate to high use of shallow groundwater. Using mileage as a determining criterion, Systems C and D routes would have the least potential impacts to groundwater resources although groundwater impacts would be few if adequate mitigation measures were employed.

None of the four system routes would have any adverse impacts to freshwater biology.

Impacts to vegetation can be divided into two subcategories: general vegetation disturbance and impacts to threatened and endangered species. Impacts to general vegetation would be generally dependent on the miles of construction (see Table 1.2-1). Based on these figures, the System C route would have less impact than either the System A, B, or D route. Impacts to threatened or endangered plant species would be of more concern than those to general vegetation. The System C route would have the least potential to significantly impact threatened or endangered plants.

Wildlife impacts can also be divided into two subcategories: general wildlife disturbance and disturbance to threatened or endangered species. In this instance, the System C route has the potential to impact fewer wildlife species in general; however,

Systems A and B would impact fewer acres of threatened or endangered species habitat. The difference between Systems A and B when compared the System C would only be 113 acres.

Socioeconomic impacts on the Mojave proposal would not cause major problems. Permanent noise impact would be less on the System A route since five to six fewer permanent noise generating sources would be present. The System A route would require only one compressor station, five fewer than System B and six fewer than Systems C or D. Impacts to recreational facilities would be less severe along the System C route.

Land use impacts would similar along the System A, B, and C routes. System D would have one more land use conflict than the other systems.

Impacts to cultural resources are difficult to determine prior to completion of a Class III cultural resources survey of the route. Based upon the current state of knowledge, the System A route has the least number of high sensitivity segments, has the potential to impact fewer sites than either the System B, C, or D routes and has the potential to impact fewer NRHP sites.

Finally, impacts to paleontology would be less severe along the System C route. This is primarily due to the reduction in the length of the Northwest line (100 MMcfd case), particularly in the Wyoming portion of the route.

Based on all of the data presented above, the System C route would cause fewer significant impacts to geology, soils, surface water, groundwater, vegetation, portions of wildlife, socioeconomics, land use, and paleontology. The System C route is definitely the overall superior route concerning environmental impacts.

Also using the data presented above, the System D route represents the least favorable route from an environmental perspective. It has the highest impact to geology, surface water, wildlife, socioeconomics, land use, cultural resources, and paleontology. The System A and B routes impacts fall between the System C and D routes.

1.3 EL DORADO PROPOSED ACTION

The El Dorado Interstate Transmission Company proposes to construct an interstate natural gas pipeline into Kern County, California from Mohave County, Arizona. The proposed El Dorado system would be approximately 381 miles long. Four components make up the El Dorado system. The North Receipt Lateral in Mohave County, would consist of approximately 16.5 miles of new pipeline. The proposed mainline would consist of approximately 256 miles of new pipeline. The East Delivery Lateral would consist of 36 miles of new pipeline, and the West Delivery

Lateral would consist of 72.5 miles of new pipeline in the San Joaquin Valley of California.

As with the Mojave proposal (Section 1.2), the El Dorado Interstate Transmission Company must obtain gas from outside sources. The same two natural gas transmission companies which plan to supply gas to Mojave could also supply gas to El Dorado. Although El Dorado proposes to deliver only 520 MMcfd of natural gas to the EOR/cogen market, the systems that follow will be capable of delivering 720 or 600 MMcfd of gas to El Dorado. As with the Mojave proposal, utilization of the Northwest, El Paso, and Transwestern systems resulted in four major ways of delivering natural gas to the start point of the El Dorado system. These four systems and the three El Dorado route variations will be outlined below. This will be followed by a discussion of the major impacts for each system. Finally, the best system or systems will be selected. Table 1.3-1 compares the impacts of the El Dorado proposal and its alternatives.

1.3.1 El Dorado System A: El Dorado, El Paso 400 MMcfd Case, and Transwestern

This proposal would entail approximately 752 miles of pipeline broken down into three components. The 381 miles of new pipeline needed for the El Dorado would be supplied with natural gas in exactly the same manner as the Mojave proposal (see Section 1.2.1). As with the Mojave proposal, System A could supply up to 720 MMcfd of natural gas to the El Dorado Interstate Transmission Company at Topock, Arizona. Since the El Dorado application has stated that El Dorado would deliver only 520 MMcfd of natural gas to the EOR/cogen market, a surplus capacity of 200 MMcfd would be available.

The proposed action would not significantly affect air quality along the route in either construction or operation. Construction impacts to air quality would represent a temporary source of both dust and engine emissions.

The route would encounter at least 12 potentially active surface faults. The potential for surface fault rupture would be greatest in the western portions of the El Dorado route. Pipeline design should be sufficient to withstand surface fault ruptures.

The pipeline route would contain approximately 14 miles of potential landslide areas. The majority of the potential landslide areas would occur along the Transwestern route. In addition to the potential landslide areas, 82 miles of the route would be constructed in areas with a slope greater than 30 percent. These areas are again concentrated along the Transwestern line with the remaining miles of slope hazard occurring in the Tehachapi Mountains portion of the El Dorado route.

Table 1.3-1

EL DORADO SUMMARY OF IMPACTS

	EL DORADO SYSTEM				EL DORADO 1/ ROUTE			
	System A 2/	System B 3/	System C 4/	System D 5/	El Dorado	Alternative A	Alternative B	Alternative C
AIR QUALITY	NSI 6/	NSI	NSI	NSI	NSI	NSI	NSI	NSI
GEOLOGY								
Surface fault rupture	12	12	10	12	10	0 (0)	0 (0)	0 (0)
Miles of landslide potential	14	14	50	98	0	0 (0)	0 (0)	0 (0)
Miles of slope greater than 30%	82	87	57	82	38	0 (3)	4 (5)	4 (8)
SOIL								
Acres of poor reclamation potential	4343	4489	3052	3632	2296	548 (457)	22 (64)	41 (73)
SURFACE WATER								
Number of stream crossings	68	71	61	120	28	3 (3)	3 (3)	1 (1)
Intermittent stream crossings	65	68	58	105	25	3 (3)	3 (3)	1 (1)
Perennial stream crossings	3	3	3	15	3	0 (0)	0 (0)	0 (0)
Moderate/high significance perennial stream crossings	0	0	0	9	0	0 (0)	0 (0)	0 (0)
GROUNDWATER								
Miles of potential impact	142	142	104	104	60	0 (0)	0 (0)	0 (0)
FRESHWATER BIOLOGY								
Number of sensitive stream crossings with fish present	0	0	0	0	0	0 (0)	0 (0)	0 (0)
TERRESTRIAL BIOLOGY								
Vegetation								
Total acres of native vegetation temporarily disturbed	9074	9124	7186	9277	4576	914 (885)	100 (121)	68 (109)
Acres of woody vegetation kept cleared for the life of the project	1838	1838	1797	1797	1608	457 (442)	44 (60)	31 (42)

Table 1.3-1 (continued)

EL DORADO SUMMARY OF IMPACTS

	EL DORADO SYSTEM				EL DORADO 1/ ROUTE			
	System A 2/	System B 3/	System C 4/	System D 5/	El Dorado	Alternative A	Alternative B	Alternative C
Vegetation (continued)								
Acres of riparian habitat crossed	24	24	24	34	22	0 (0)	0 (0)	0 (0)
Acres of federally threatened or endangered plant habitat affected	60	60	0	0	0	0 (0)	0 (0)	0 (0)
Number of species	1	1	0	0	0	0 (0)	0 (0)	0 (0)
Acres of California state listed plant habitat affected	947	947	947	947	947	0 (0)	0 (0)	73 (73)
Number of species	3	3	3	3	3	0 (0)	0 (0)	3 (3)
Acres of agricultural land temporarily disturbed	525	525	489	673	489	0 (0)	0 (0)	12 (0)
Wildlife								
Big game crucial or high priority habitat (acres)	748	748	448	1437	85	0 (0)	0 (0)	0 (0)
Big game migration corridors (acres)	121	121	121	121	121	0 (0)	0 (0)	0 (0)
Big game fawning/ calving areas (acres)	0	0	0	0	0	0 (0)	0 (0)	0 (0)
Upland game bird sensitive habitat (acres)	0	0	24	30	0	0 (0)	0 (0)	0 (0)
Waterfowl critical nesting areas (acres)	0	0	0	0	0	0 (0)	0 (0)	0 (0)
Raptor nesting areas (nests)	0	0	0	2	0	0 (0)	0 (0)	0 (0)
Acres of potential threatened or endangered animal habitat	9231	10539	9352	10270	7446	912 (885)	104 (121)	71 (121)

Table 1.3-1 (continued)

EL DORADO SUMMARY OF IMPACTS

	EL DORADO SYSTEM				EL DORADO 1/ ROUTE			
	System A 2/	System B 3/	System C 4/	System D 5/	El Dorado	Alternative A	Alternative B	Alternative C
Wildlife (continued)								
Yuma clapper rail	97	97	85	85	73	0 (0)	0 (0)	0 (0)
Bald eagle	169	169	157	169	145	0 (0)	0 (0)	0 (0)
Peregrine falcon	490	490	163	163	163	0 (0)	0 (0)	0 (0)
Whooping crane	0	0	0	0	0	0 (0)	0 (0)	0 (0)
California condor	1730	1730	1730	1730	1730	0 (0)	101 (121)	68 (109)
Desert tortoise	2756	2756	2998	2998	2683	912 (885)	0 (0)	0 (0)
Blunt-nosed leopard lizard	388	388	388	388	388	0 (0)	0 (0)	0 (0)
Tehachapi slender salamander	0	0	0	0	0	0 (0)	3 (0)	3 (0)
San Joaquin kit fox	533	533	533	533	533	0 (0)	0 (0)	68 (12)
Black-footed ferret	1345	2645	1567	2473	0	0 (0)	0 (0)	0 (0)
Mojave ground squirrel	702	702	702	702	702	0 (0)	0 (0)	0 (0)
Nelson's antelope squirrel	363	363	363	363	363	0 (0)	0 (0)	0 (0)
Tipton kangaroo rat	97	97	97	97	97	0 (0)	0 (0)	0 (0)
Short-nosed kangaroo rat	436	436	436	436	436	0 (0)	0 (0)	0 (0)
Giant kangaroo rat	133	133	133	133	133	0 (0)	0 (0)	0 (0)
SOCIOECONOMICS								
Population change greater than 10%	No	No	No	No	No	No	No	No
Total employment change > 10%	No	No	No	No	No	No	No	No
Income change >10%	No	No	No	No	No	No	No	No

Table 1.3-1 (continued)

EL DORADO SUMMARY OF IMPACTS

	EL DORADO SYSTEM				EL DORADO 1/ ROUTE			
	System A 2/	System B 3/	System C 4/	System D 5/	El Dorado	Alternative A	Alternative B	Alternative C
SOCIOECONOMICS (continued)								
Vacancy rates of temporary housing less than 5%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local tax base change > 10%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Traffic	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
Operational noise	NSI	NSI	NSI	NSI	NSI	NSI	NSI	NSI
Recreation (conflicts)	2	2	2	2	2	0 (0)	0 (0)	0 (0)
LAND USE/OWNERSHIP								
Number of conflicts	5	5	5	7	4	0 (0)	1 (0)	0 (0)
CULTURAL RESOURCES								
Number of sites in direct impact zone	86	96	97	233	45	2 (5)	0 (2)	2 (1)
NRHP listed or eligible sites in the direct impact zone	2	2	4	7	2	0 (0)	0 (0)	0 (0)
Percentage of line actually surveyed	12	13	15	27	16	0 (0)	2 (2)	71 (0)
Miles of high sensitivity	8	9	9	14	4	1 (0)	0 (0)	0 (0)
PALEONTOLOGIC RESOURCES								
Acres of impact to high sensitivity formations	2935	3054	2456	3310	1670	7 (65)	0 (0)	0 (0)
VISUAL RESOURCES								
Acres of high visual impact	318	318	318	318	318	0 (318)	0 (0)	0 (0)

1/ The first entry for each resource area under alternative routing represents the value for the alternative segment only; the value in parenthesis represents the comparable quanity for the portion of the proposed route which would be avoided by using this alternative.
2/ El Dorado System A: El Dorado, El Paso 400 MMcfd Case, and Transwestern
3/ El Dorado System B: El Dorado, El Paso 400 MMcfd Alternative (100/300 Case), Northwest 100 MMcfd Case, and Transwestern
4/ El Dorado System C: El Dorado, El Paso 600 MMcfd Alternative (100/500 Case), and Northwest 100 MMcfd Case
5/ El Dorado System D: El Dorado, El Paso 600 MMcfd Alternative (200/400 Case), and Northwest 200 MMcfd Case
6/ NSI = No Significant Impact

Approximately 4,343 acres of the route would occur in areas with potential poor reclamation soils. These areas would occur primarily along the El Dorado and Transwestern lines. The limiting factor on soil reclamation potential, a lack of precipitation, would inhibit revegetation efforts.

The proposed route would cross 68 intermittent and perennial streams. Three perennial stream crossings would be necessary.

Potential impacts to groundwater could occur along 142 miles of the proposed route. This is four miles more than Mojave Systems A and B because the El Dorado proposed route more closely follows Mojave Alternative B in the vicinity of the Mojave River. It is unlikely that impacts to groundwater would be significant if the proper mitigation measures were implemented during construction.

The El Dorado System A proposal would have no impacts to freshwater biology since none of the stream crossings discussed in surface water have a potential to contain sensitive aquatic species.

The proposed action would temporarily disturb 9,074 acres of native vegetation. None of the proposed route would cross unique or extremely sensitive vegetation types except for Joshua trees and cactus which are scattered in the creosote bush and saltbush vegetation types. The route would keep 1,838 acres of woody vegetation, primarily creosote bush, cleared from the operational ROW for the life of the project. Construction of the route would impact approximately 24 acres of riparian vegetation. These areas, however, should recover quickly.

The proposed route has the potential to impact the habitat of one federally threatened plant species. This would represent approximately 60 acres of federally listed plant species habitat primarily located along the Transwestern line. Three California state listed plant species would be impacted. These plants could occur along 947 acres of the El Dorado route.

The proposed route would also temporarily disturb 525 acres of agricultural land, primarily along the El Dorado route. These impacts would not last over one agricultural season. The route would also permanently remove 273 acres of orchards and vineyards from production.

The proposed El Dorado System A route would cross 748 acres of big game critical or high priority habitat and 121 acres of big game migration corridors.

The proposed route would impact 9,231 acres of wildlife habitat of species of special concern. Table 1.3-1 lists the acres of impacts for individual species. Significantly impacted species habitat (over 500 acres each) would include the peregrine falcon, California condor, desert tortoise, blunt-nosed leopard lizard,

San Joaquin kit fox, black-footed ferret, and Mojave ground squirrel.

The construction workforce would place a significant but temporary demand on housing and campgrounds in portions of Arizona, New Mexico and in San Bernardino County, California. These impacts would occur during the construction phase only. Property tax revenues would increase more than 10 percent in five counties crossed by the pipeline.

The proposed route would cause no significant impacts to traffic since all paved roads along the route would be crossed by boring beneath the pavement. Noise impacts caused by construction would be temporary and would generally occur during working hours. Since the majority of the proposed route is located in relatively uninhabited areas, noise resulting from construction should not present a problem. Noise resulting from compressor station operation will be monitored and should be below the 55 dBA level used by FERC as being potentially significant.

The proposed route would conflict with the operation of two recreation areas. These impacts would generally be temporary in nature but could produce significant impacts to the Stoddard Valley Recreation Use Area and to the Pacific Crest National Scenic Trail. The remaining impacts to recreation facilities would involve traffic delays and noise around parks, and increased usage of park facilities by construction workers. These impacts would cease following completion of construction.

The El Dorado System A route would conflict with zoning regulations around the Golden Shores Subdivision along the North Receipt Lateral. The route also has the potential to impede development in the area between Barstow and Boron. There are also land use conflicts on Edwards Air Force Base and the Havasu Wildlife Refuge.

Other potential land use conflicts could occur along Transwestern Loop G which would not be in conformance with the Coconino National Forest Plan. This conflict could be easily resolved by keeping Loop G north of the existing line in the vicinity of the Fort Valley Experimental Forest.

The System A route contains eight 25-mile long segments which have a high cultural resources sensitivity rating. Compliance procedures should provide adequate mitigation to potentially significant impacts.

Approximately 2,935 acres of significant paleontological formations would be crossed by the proposed route. Since this figure indicates potentially significant areas, it is difficult to determine the exact amount of significant areas. If adequate mitigation measures are implemented, the potential impacts to paleontological resources should be much lower.

San Joaquin kit fox, black-footed ferret, and Mohave ground squirrel.

The construction workforce would place a significant but temporary demand on housing and campgrounds in portions of Arizona, New Mexico and in San Bernardino County, California. These impacts would occur during the construction phase only. Property tax revenues would increase more than 10 percent in five counties crossed by the pipeline.

The proposed route would cause no significant impacts to traffic since all paved roads along the route would be crossed by boring beneath the pavement. Noise impacts caused by construction would be temporary and would generally occur during daytime hours. Since the majority of the proposed route is located in relatively uninhabited areas, noise resulting from construction should not present a problem. Noise resulting from compressor station operation will be monitored and should be below the 55 dBA level used by FERC as being potentially significant.

The proposed route would conflict with the operation of two recreation areas. These impacts would generally be temporary in nature but would produce significant impacts to the Stoddard Valley Recreation Use Area and to the Pacific Crest National Scenic Trail. The remaining impacts to recreation facilities would involve traffic delays and noise around parks and increased usage of park facilities by construction workers. These impacts would cease following completion of construction.

The El Dorado System A route would conflict with zoning regulations around the Golden Shores Subdivision along the Mohave Receipt Lateral. The route also has the potential to impede development in the area between Needles and Topock. There are also land use conflicts on Edwards Air Force Base and the Havasu Wildlife Refuge.

Other potential land use conflicts could occur along Transwestern Loop 2 which would not be in conformance with the Coconino National Forest Plan. This conflict would be easily resolved by keeping Loop 2 north of the existing line in the vicinity of the Fort Valley Experimental Forest.

The System A route contains eight 25-mile long segments which have a high cultural resources sensitivity rating. Compliance procedures should provide adequate mitigation to potentially significant impacts.

Approximately 1,235 acres of significant paleontological formations would be crossed by the proposed route. Since this figure includes potentially significant areas, it is difficult to determine the exact amount of significant areas. If adequate mitigation measures are implemented, the potential impacts to paleontological resources should be much lower.

Approximately 318 acres of the route would cause potentially high visual impacts. These impacts would occur along portions of the route in the eastern Mojave Desert.

1.3.2 EL Dorado System B: El Dorado, El Paso 400 MMcfd Alternative (100/300 Case), Northwest 100 MMcfd Case, and Transwestern

This four-component system proposal would require construction of 775 miles of pipeline. The support facilities required to supply the El Dorado pipeline would be unchanged from those discussed for the Mojave System B (Section 1.2.2). This project could supply a maximum of 720 MMcfd of natural gas to the EOR/cogen market. This would leave a surplus of 200 MMcfd supply capacity at Topock.

This proposed action would not significantly affect air quality along the route in either construction or operation. Two new compressor stations would be required on the Northwest line as well as additional compression at the Bondad station on the El Paso line. These stations would meet all state and federal regulations.

The System B route would encounter at least 12 potentially active surface faults, the same as discussed for the El Dorado System A route. Again, the potential for surface fault rupture would be greatest in the western portions of the El Dorado line. The route would also contain approximately 14 miles of potential landslide areas, the same as for System A. This route would also have 87 miles of slopes greater than 30 percent, five more miles than the System B route.

Approximately 4,489 acres of this route would occur in areas with soils with a poor reclamation potential. This represents 146 fewer than the System A route.

The El Dorado System B route would cross 71 intermittent and perennial streams, three more than the System A route. Only three perennial streams would be crossed by this route, the same as the System A route.

Groundwater impacts could occur along 142 miles of the route, the same as the System A route. Again, all impacts to groundwater should be mitigatable. Like the System A route, this routing would have no significant impacts to freshwater biology resources.

This routing system would temporarily disturb 9,124 acres of native vegetation. This is 50 more than the System A route. The route would also keep 1,838 acres of woody vegetation permanently cleared from the operational ROW, unchanged from the System A route. The route would also cross 24 acres of riparian habitat, the same as the previously described route.

The route has the potential to impact one federally threatened plant species and its habitat, the same as System A. This would represent 60 acres of federally listed plant species habitat, unchanged from System A. This alternative would have the same number of California state listed plants and the same mileage impacts as those discussed for the System A route.

This route would also temporarily disturb 525 acres of agricultural land, the same as the System A route. The alternative would also permanently remove the same number of acres of orchards and vineyards from production as System A.

The proposed El Dorado System B route would cross 748 acres of big game critical/high priority habitat and 121 acres of big game migration corridors. The impacts would be the same as would occur on the System A route.

The route would also impact 10,539 acres of habitat of wildlife species of special concern, 1308 more than System A. Table 1.3-1 shows the comparisons of all wildlife species of special concern. Significantly impacted species habitat would include the peregrine falcon, California condor, desert tortoise, San Joaquin kit fox, black-footed ferret, and Mojave ground squirrel.

The construction workforce would place a significant but temporary demand on housing and campgrounds in areas of Wyoming, Arizona, New Mexico, and in San Bernardino County. Except for Wyoming and northwestern New Mexico, these would involve the same impacts as those identified under the System A proposal. Property tax revenues would increase more than 10 percent in five counties crossed by the pipeline.

The proposed route would cause no significant impacts to traffic. Noise impacts on this line would be similar to those discussed above; however, since two new compressor stations would be required along with additional compression at the Bondad station, the route would create more permanent noise.

The System B route would have similar impacts to recreation areas and land use as those discussed for System A.

The System B route contains nine 25-mile long segments having a high cultural resources sensitivity rating, one more than the System A route.

Approximately 3,054 acres of significant paleontological formations would be crossed by the route. This is 119 more than the System A route.

Approximately 318 acres of significant visually high impacts would occur along the route, the same as for System A route.

1.3.3 El Dorado System C: El Dorado, El Paso 600 MMcfd Alternative, (100/500 Case) and Northwest 100 MMcfd Case

This three-component system proposal would require construction of 587 miles of pipeline. The support facilities required to supply the El Dorado pipeline would be unchanged from those discussed for the Mojave System C route (Section 1.2.3). This project would supply a maximum of 600 MMcfd of natural gas to the EOR/cogen market. This would make available a surplus of 80 MMcfd at Topock over that proposed by El Dorado in its application.

Air quality impact related to construction would be less than either the System A or B routes. The two new compressor stations and additional compression at four other stations would meet all applicable state and federal air quality regulations. Air quality concerns, therefore, would be similar to System B.

This system routing would encounter at least ten potentially active surface faults, two less than either System A or B. This route would have 50 miles of potential landslide areas, 36 more miles than the System A and the System B routes. Approximately 57 miles of the route would be built in areas with slopes greater than 30 percent. This is 25 fewer of potential impact than the System A route and 30 fewer than the System B route.

Soils with potentially poor reclamation would occur on 3,052 acres of the System C route. This is 1,291 fewer acres than the System A route and 1,437 fewer than the System B route.

The proposed route would cross 61 intermittent and perennial streams, seven fewer than the System A route and ten fewer than the System B route. Three perennial streams would be crossed by this route, the same as Systems A and B.

Potential impacts to groundwater could occur along 104 miles of the route, 38 fewer miles than the System A and B routes. Like the System A and B routes, freshwater biology resources would not be significantly impacted by the route.

The System C route would temporarily disturb 7,186 acres of native vegetation. No portions of the route would affect unique or extremely sensitive vegetation types except for Joshua trees and cactus. This acreage figure is 1,888 and 1,938 fewer than would be impacted by either the System A or B routes respectively.

The alternative would keep 1,797 acres of woody vegetation permanently cleared from the operational ROW. This represents 41 fewer acres of permanent impact than the System A and B routes. Construction of the route would impact approximately 24 acres of riparian vegetation, the same as the System A and B routes.

This route would not impact any federally threatened or endangered plant species or plant species habitat. This is 60 fewer acres than the System A or B routes. The California state listed plant species and the number of miles of potential habitat for all three systems would remain the same.

This route would temporarily disturb 489 acres of agricultural land primarily along the El Dorado route. This is 36 fewer acres than either the System A or System B routes. The route would also permanently remove 273 acres of orchards and vineyards from production for the life of the project. This number remains unchanged from Systems A and B.

The proposed System C route would impact 448 acres of big game critical habitat, 300 fewer than either the System A or B routes. The impacts to big game migration corridors would be unchanged. Twenty-four acres of impacts to upland game bird sensitive habitat would occur as opposed to no impacts for either System A or B.

The proposed route would also impact 9,352 acres of wildlife habitat of species of special concern. This represents an increase of 121 acres over the System A route and a 1157 acre decrease from the System B route. Increases in acreage occur primarily with the desert tortoise habitat.

The construction workforce would place a significant but temporary demand on housing and campgrounds in areas of Wyoming portions of Arizona and New Mexico, and San Bernardino County in California. These impacts would be essentially the same as either the System A or B routes, although impacts in Arizona and New Mexico may not be as severe since both El Paso and Transwestern workforces would not be in the area simultaneously. Property tax revenues would increase more than 10 percent in one county crossed by the pipeline.

Traffic and noise impacts would be similar to those discussed for System B. Recreational facilities impacts would be similar to those discussed for Systems A and B.

The proposed El Dorado System C route has the potential to impede development in the area between Barstow and Boron. The land use conflicts with Edwards Air Force Base would still be present.

The remaining land use conflicts along the route include the last 11 miles of the Hackberry Loop on the El Paso line which have been zoned residential. Portions of the westernmost 4.2 miles of the Flagstaff Loop would be in conflict with the Elden Environmental Study Area located within the Coconino National Forest. The remainder of the land use problems would be the same as those discussed for the System A and B routes. The conflicts associated with the Transwestern line concerning the Coconino National Forest Plan would be eliminated.

The System C route contains nine 25-mile long segments with a high cultural resources sensitivity rating, one more sensitive segment than System A and the same number as System B.

This route has the potential to impact 2,456 acres of significant paleontological formations. This is 479 and 598 fewer acres than the System A and B routes, respectively.

Visual impacts for the System C route remain unchanged from either the System A or B routes.

1.3.4 El Dorado System D: El Dorado, El Paso 600 MMcfd Alternative,(200/400 Case) and Northwest 200 MMcfd Case

This three-component system would require construction of 751 miles of pipeline. The support facilities required to supply the El Dorado pipeline would be unchanged from those discussed for the Mojave System D route (Section 1.2.4). This project would supply a maximum of 600 MMcfd of natural gas to the EOR/cogen market. This would make available a surplus of 80 MMcfd at Topock over that proposed by El Dorado in its application.

This alternative would not significantly affect air quality along the route for either construction or operation. The two new compressor stations and the additional compression at four other stations would meet all applicable state and federal air quality regulations. Air quality concerns, therefore, would remain unchanged from either Systems A, B, or C.

This system routing would encounter at least 12 potentially active surface faults, two more than System C and the same number as for Systems A or B. This route would have 98 miles of potential landslide areas, 84 more miles than the System A or B routes and 48 more miles than the System C route. Approximately 82 miles of the route would be built in areas with slopes greater than 30 percent. This is the same as for the System A route, five fewer miles than the System B route, and 25 more miles than the System C route.

Soils with potentially poor reclamation would occur on 3,632 acres of the System D route. This is 711 and 857 fewer than the System A and B routes, respectively. It also represents 580 more acres of disturbance than would occur on the System C route.

The route would cross 120 intermittent and perennial streams, 52, 49, and 59 more than the System A, B, and C routes, respectively. Fifteen perennial streams would be crossed by this route, twelve more than the other three systems. Nine highly significant perennial stream crossings would occur on the System D route as opposed to no sensitive stream crossings on any of the other El Dorado system routes.

Potential impacts to groundwater could occur along 104 miles of the route, 38 fewer miles than either the System A or B routes and the same number of miles as the System C route. Like the System A, B, and C routes, freshwater biology resources would not be significantly impacted by the route.

The System D route would temporarily disturb 9,277 acres of native vegetation. No portions of the route would affect unique or extremely sensitive vegetation types except for Joshua trees and cactus. This acreage is 203, 153, and 2,091 more than would be impacted by either the System A, B, or C routes, respectively.

The routing would keep 1,797 acres of woody vegetation permanently cleared from the operational ROW. This represents 41 fewer acres of permanent impact than the System A or B routes, and the same number of acres of disturbance as the System C route. Construction of the route would impact approximately 34 acres of riparian vegetation, ten more than any of the other systems.

This route would not impact any federally threatened or endangered plant species or its habitat. This is 60 fewer acres than either the System A or B routes and the same as the System C route. The California state listed plant species and the number of miles of potential habitat for all four systems would remain the same.

This route would temporarily disturb 673 acres of agricultural land primarily along the El Dorado route. This is 148 more acres than either the System A or B routes and 184 acres than the System C route. Impacts to orchards and vineyards would remain unchanged.

The proposed System D route would impact 1,437 acres of big game critical habitat, 689 fewer than either the System A or B routes and 989 more than the System C route. The impacts to big game migration corridors would be unchanged. Impacts to upland game bird sensitive habitat could occur to 30 acres, 30 more than were identified for System A or B and six more than were identified for System C. The System D route would also impact two raptor nests, two more than any of the previous systems.

The proposed route would also impact 10,270 acres of wildlife habitat of species of special concern. This represents an increase of 1,039 and 918 over the System A and B routes, respectively, and a decrease of 269 over the System C route. Increases in acreage occur primarily in desert tortoise and black-footed ferret habitat.

The construction workforce of System D would place a significant but temporary demand on housing and campgrounds in areas of Wyoming, Utah, Arizona, New Mexico and San Bernardino County in California. These impacts would be essentially the same as those discussed above, but since the workforce in Arizona would only be

from El Paso rather than El Paso and Transwestern, the impacts would not be as severe as for Systems A or B. Property tax revenues would increase more than 10 percent in four counties crossed by the pipeline.

Traffic and noise impacts would remain essentially unchanged from those discussed for System C. Impacts to recreational facilities would remain essentially unchanged from those discussed for System B.

The El Dorado System D route would have land use impacts similar to those discussed for System C. The remaining land use conflicts along the route include the problems associated with commercial and residential development along the Moab Loop and the proximity of the Cisco Loop to Arches National Park and the Lost Springs WSA, on the Northwestern loops.

System D contains three 25-mile long segments with a very high cultural resources sensitivity and eleven 25-mile long segments with a high sensitivity rating. These sensitivity ratings are much higher than any of the other system routes.

This route has the potential to impact 3,310 acres of significant paleontological formations. This is 375, 256, and 854 more than the System A, B, and C routes, respectively.

Visual impacts for the System D route would be of concern at Arches National Park and Lost Springs WSA in addition to the area identified for Systems A, B, and C.

1.3.5 El Dorado Alternative A

Alternative A would replace 73 miles of the El Dorado mainline between MP 37 and 110 in the eastern Mojave Desert. The Alternative A route is 2.4 miles longer than the proposed route and is similar to the Mojave mainline route.

Impacts to air quality, surface water, and freshwater biology would remain unchanged from the El Dorado proposed route.

The Alternative A route would have the same geological impact as the proposed route except in the category of slope greater than 30 percent. The portion of the mainline route replaced by Alternative A has three miles of slope greater than 30 percent while the Alternative A route has no mileage in this category.

Alternative A would have 548 acres of impacts to soils with a poor reclamation potential compared with 457 acres for the portion of the mainline it would replace.

Alternative A would have about the same potential for impact to groundwater as opposed to no impact on the portion of the route it would replace.

The El Dorado Alternative A route would increase impacts to total areas of native vegetation temporarily disturbed by 29. It would also increase impacts to acres of woody vegetation kept cleared for the life of the project by 15.

Neither the alternative nor the portion of the proposed route which would be avoided have the potential to affect riparian habitat, federally threatened or endangered plant species and the number of California state listed plant species or their habitat, agricultural land, big game critical habitat, big game migration corridors, upland game bird sensitive habitat, or raptor nesting.

The Alternative A route would have 27 more acres of impacts to wildlife habitats of species of special concern. This increase occurs within the habitat of the desert tortoise.

Socioeconomic, traffic, noise, and recreation impacts along the Alternative A route would be similar to those discussed for the proposed mainline.

The El Dorado Alternative A route would avoid the potential land use conflict present in the proposed routing, the proposed Mojave National Park immediately north of the proposed route.

The Alternative A route would not differ in the number of NRHP properties, in the amount of survey coverage, or in the sensitivity ratings from the portion of the mainline it would replace.

The Alternative A route would contain 58 fewer acres of significant paleontological formations.

No visual impacts would be present on the Alternative A route, 318 fewer acres than on the portion of the mainline it would replace.

1.3.6 El Dorado Alternative B

Alternative B would replace 10 miles of the El Dorado mainline between MP 240 and 250. The Alternative B route is almost two miles shorter than the proposed route.

Impacts to air quality, surface water, groundwater, and freshwater biology would remain unchanged from the El Dorado proposed route.

Impacts caused by surface fault rupture and landslide potential would remain unchanged; however, one less mile of slope greater than 30 percent would be present along the Alternative B route than would occur along the proposed route.

Alternative B would impact 22 acres of soils with poor reclamation potential as opposed to 64 acres along the proposed route.

The El Dorado Alternative B route would have 21 fewer acres of impacts to native vegetation than the proposed route and 16 fewer acres of impacts to woody vegetation permanently removed from the operational ROW.

Neither Alternative B nor the portion of the proposed route avoided would have an effect on riparian habitat, federal and California state listed threatened or endangered plant species or their habitat, agricultural lands, or general wildlife (see Table 1.3-1). The alternative would have 17 fewer acres of impacts to California condor habitat and three acres more impact to Tehachapi slender salamander habitat, both species of special concern.

Socioeconomic, traffic, noise, and recreation impacts along the Alternative B route would be similar to those discussed for the proposed route.

The El Dorado Alternative B route would have one additional land use conflict which was not present in the proposed route. The Alternative B route would cause impacts to the Bear Valley Springs community, particularly to the existing residential area and to future development.

The Alternative B route contains no known cultural resource sites, two fewer than the portion of the mainline it would replace. No NRHP properties would be affected by either of the routes. Survey coverage for both routes is roughly equivalent and no high sensitivity segments are present.

Both paleontological resources and visual resources impacts would remain unchanged from the proposed route.

1.3.7 El Dorado Alternative C

Alternative C would depart from the proposed mainline route at approximately MP 247 at the western end of the Cummings Valley. It would traverse mountain valleys and ridges, descend the Tehachapi Mountains, and rejoin the proposed mainline at MP 256. The Alternative C route is approximately 3.3 miles shorter than the proposed route.

Impacts to air quality, surface water, groundwater, and freshwater biology would remain unchanged from the proposed route.

Impacts along the Alternative C route with regard to surface fault rupture and landslide potentials would remain unchanged from the proposed route. Alternative C, however, does have four

fewer miles of slopes greater than 30 percent than the portion of the mainline it would replace.

Alternative C would impact 41 acres of soils with poor reclamation potential, 32 fewer than the portion of the mainline it would replace.

This routing alternative would impact 41 fewer acres of native vegetation and nine fewer acres of permanently cleared woody vegetation than on the portion of the proposed mainline it would replace.

Acres of riparian habitat crossed and the numbers and associated habitat of federally threatened or endangered plants would remain unchanged from the proposed route. California state listed plant species would also remain unchanged. Impacts to agricultural lands would increase by 12 acres when compared to the portion of the mainline it would replace.

The Alternative C route would have no changes in the amount of impacts caused to wildlife species. The route would impact 50 fewer acres of California condor habitat; however, there is an increase of 56 acres in San Joaquin kit fox habitat and a three acre increase in Tehachapi slender salamander habitat.

Socioeconomic, traffic, noise, recreation, and land use impacts along the Alternative C route would be similar to those discussed for the proposed route.

One more cultural resource site would be encountered on Alternative C than would occur on the proposed route. Alternative C, however, has been surveyed at the 71.4 percent level, much higher than the proposed route. No NRHP properties have been identified on either route and no high sensitivity rating segments are present.

Impacts to paleontological resources and visual resources would be equivalent to those discussed for the proposed route.

1.3.8 The El Dorado Proposal Best Case

Based on the above discussion, the proposal with the least environmental impact is the El Dorado proposed route. Differences between the proposal, Alternative A and Alternative C are so minor that no preference need be assigned. On the other hand Alternative B would unnecessarily affect established development in Bear Valley Springs with no substantial offsetting gains.

The selection of the best system to supply El Dorado is based on precisely the same factors used for Mojave since the supplying projects are identical. Consequently the El Dorado System C would be preferable to the other systems.

1.4 KERN RIVER PROPOSED ACTION

Kern River Gas Transmission Company (Kern River) proposes to construct, own, and operate an interstate natural gas transmission pipeline from Opal, Wyoming, to Kern County, California. The proposed Kern River system would be approximately 837 miles long. Three components make up the Kern River system: the 756-mile long mainline and the Kern River (27 miles) and Taft (47 miles) Laterals.

Kern River proposes to provide the capacity to transport up to 700 MMcfd of natural gas from two major existing sources: the Overthrust Belt gas fields in southwest Wyoming and northeast Utah, and the western Canadian gas fields. Canadian gas would be received at the border and transported through the existing Northwest system from Sumas, Washington, to southwest Wyoming where it would be delivered to Kern River near Opal. No new facilities would be required by Northwest to transport this gas. Overthrust gas would be collected from fields adjacent to Kern River's proposed mainline.

In addition to Kern River's proposed route, six variations are examined in this document. The Kern River Proposal and the alternatives are outlined below with the major impacts discussed. Table 1.4-1 compares impacts associated with the Kern River proposal and its alternatives.

1.4.1 Kern River Proposal

The Kern River system would interconnect with Northwest's interstate transmission system near Opal, Wyoming, run through 15 counties in four states, and terminate in the Bakersfield, California, area. Three compressor stations providing a total of 35,500 hp would be constructed as part of the project. The route would follow existing utility and transportation corridors for approximately 54 percent of its length.

The proposed action would not significantly affect air quality along the route during either construction or operation. Construction impacts to air quality would represent a temporary source of both dust and engine emissions. Operation of the three new compressor stations located in Wyoming, Utah, and Nevada would meet all applicable state and federal regulations.

The proposed route would encounter at least 20 potentially active surface faults. The potential for surface fault ruptures would be greatest in the western portions of the route in California and the central Utah portion of the route. Pipeline design criteria would adequately mitigate potential hazards due to surface fault ruptures.

Table 1.4-1

KERN RIVER SUMMARY OF IMPACTS 1/

	Kern River Proposed	Wasatch Variation	West Strawberry Variation	Salt Creek Canyon Variation	North Las Vegas Variation	Henderson Variation	North Bakersfield Variation
AIR QUALITY	NSI 2/	NSI	NSI	NSI	NSI	NSI	NSI
GEOLOGY							
Surface fault rupture	20	2 (1)	0 (0)	1 (1)	1 (1)	0 (0)	4 (6)
Miles of landslide potential	101	33 (66)	12 (38)	4 (8)	0 (0)	0 (0)	10 (2)
Miles of slope greater than 30%	229	44 (61)	23 (42)	0 (6)	8 (5)	0 (0)	29 (10)
SOIL							
Acres of poor reclamation potential	4882	703 (1570)	218 (812)	60 (60)	1236 (927)	170 (121)	242 (160)
SURFACE WATER							
Number of stream crossings	135	46 (40)	21 (20)	1 (7)	13 (7)	0 (2)	21 (11)
Intermittent stream crossings	83	30 (10)	3 (2)	0 (4)	13 (7)	0 (2)	20 (10)
Perennial stream crossings	52	16 (30)	17 (17)	1 (3)	0 (0)	0 (0)	1 (1)
Moderate/high significance perennial stream crossings	39	12 (24)	11 (15)	0 (3)	0 (0)	0 (0)	0 (0)
GROUNDWATER							
Miles of potential impact	126	48 (52)	64 (56)	4 (4)	0 (1)	0 (0)	36 (30)
FRESHWATER BIOLOGY							
Number of sensitive stream crossings with fish present	13	6 (12)	1 (5)	1 (2)	0 (0)	0 (0)	0 (0)
TERRESTRIAL BIOLOGY							
Vegetation							
Total acres of native vegetation temporarily disturbed	10207	1280 (1576)	780 (715)	170 (194)	1320 (1164)	190 (141)	1350 (1007)
Acres of woody vegetation kept cleared for the life of the project	4201	290 (612)	285 (295)	12 (45)	665 (544)	95 (24)	210 (98)
Acres of riparian habitat crossed	98	125 (61)	105 (25)	0 (0)	10 (24)	0 (0)	10 (0)

Table 1.4-1 (continued)
KERN RIVER SUMMARY OF IMPACTS 1/

	Kern River Proposed	Wasatch Variation	West Strawberry Variation	Salt Creek Canyon Variation	North Las Vegas Variation	Henderson Variation	North Bakersfield Variation
Vegetation (continued)							
Acres of federally threatened or endangered plant habitat affected	0	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Number of species	0	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	1 (0)
Acres of California classified plant species affected	470	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	82 (41)
Number of species	4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
Acres of agricultural land temporarily disturbed	1561	425 (138)	24 (24)	145 (78)	0 (2)	0 (0)	350 (353)
Wildlife							
Big game crucial or high priority habitat (acres)	1350	493 (688)	282 (397)	12 (75)	0 (0)	0 (0)	0 (0)
Big game migration corridor (acres)	162	0 (77)	0 (0)	0 (0)	0 (37)	0 (0)	0 (0)
Big game fawning/calving area (acres)	0	0 (0)	50 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Upland game bird sensitive habitat (acres)	404	24 (0)	164 (40)	0 (0)	0 (0)	0 (0)	0 (0)
Waterfowl critical nesting areas (acres)	60	22 (36)	0 (0)	0 (36)	0 (0)	0 (0)	0 (0)
Raptor nesting areas (nests)	11	7 (4)	5 (4)	2 (0)	0 (0)	0 (0)	0 (0)
Acres of potential threatened or engangered animal habitat	8667	65 (18)	0 (0)	12 (0)	424 (454)	0 (0)	2946 (2561)
Yuma clapper rail	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Bald eagle	121	65 (18)	0 (0)	12 (0)	0 (0)	0 (0)	0 (0)
Peregrine falcon	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Whooping crane	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
California condor	1900	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1261 (1141)

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Table 1.4-1 (continued)

KERN RIVER SUMMARY OF IMPACTS 1/

	Kern River Proposed	Wasatch Variation	West Strawberry Variation	Salt Creek Canyon Variation	North Las Vegas Variation	Henderson Variation	North Bakersfield Variation
Wildlife (continued)							
Blunt-nosed leopard lizard	339	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	424 (279)
Tehachapi slender salamander	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	12 (0)
Desert tortoise	3716	0 (0)	0 (0)	0 (0)	424 (454)	0 (0)	0 (0)
San Joaquin kit fox	351	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	424 (351)
Black-footed ferret	600	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Utah prairie dog	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Mojave ground squirrel	850	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Nelson's antelope squirrel	290	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	292 (290)
Tipton kangaroo rat	30	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	73 (30)
Short-nosed kangaroo rat	290	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	280 (290)
Giant kangaroo rat	180	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	180 (180)
SOCIOECONOMICS							
Population change >10%	No	No	No	No	No	No	No
Total employment change >10%	No	No	No	No	No	No	No
Income change >10%	No	No	No	No	No	No	No
Vacancy rates of temporary housing <5%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local tax base change >10%	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Traffic	NSI	NSI	NSI	NSI	NSI	NSI	NSI
Operational noise	NSI	NSI	NSI	NSI	NSI	NSI	
Recreation (conflicts)	5	2 (1)	1 (0)	0 (0)	1 (2)	0 (0)	0 (0)

Table 1.4-1 (continued)

KERN RIVER SUMMARY OF IMPACTS 1/

	Kern River Proposed	Wasatch Variation	West Strawberry Variation	Salt Creek Canyon Variation	North Las Vegas Variation	Henderson Variation	North Bakersfield Variation
LAND USE/OWNERSHIP							
Number of conflicts	9	2 (1)	2 (1)	0 (0)	1 (5)	0 (1)	0 (0)
CULTURAL RESOURCES							
Number of sites in the direct impact zone	77	5 (2)	1 (2)	0 (0)	6 (5)	0 (0)	4 (5)
NRHP listed or eligible sites in the direct impact zone	4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Percentage of line actually surveyed	5	1 (1)	0 (0)	0 (0)	17 (12)	9 (11)	8 (7)
High sensitivity segments	9	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (1)
PALEONTOLOGIC RESOURCES							
Acres of impact to significant formations	6119	1716 (776)	602 (447)	0 (0)	1305 (1124)	185 (194)	556 (45)
VISUAL RESOURCES							
Acres of high visual impact	510	28 (173)	97 (101)	0 (0)	0 (76)	0 (0)	0 (0)

1/ The first entry for each resource under route variations represents the value for the variation segment only; the value in parenthesis represents the comparable quanity for the portion of the proposed route which would be avoided by using this variation.

2/ NSI = No Significant Impact

The pipeline route would cross approximately 101 miles of potential landslide areas. The majority of the potential landslide areas would occur between MP 78 and 186. In addition to the miles of landslide potential, 229 miles of the route would be constructed in areas with a slope greater than 30 percent. These areas are again concentrated along the mountainous portions of the Kern River route in north-central Utah and the Tehachapi Mountains portion of the route in southern California.

The proposed route would cross approximately 4,882 acres of land in areas with soils having poor reclamation potential. These areas are located primarily in the Mojave Desert geographic region in California (MP 535 to 713), although impacts in the Middle Rocky Mountains (MP 70 to 185) and Basin and Range (MP 185 to 535) areas of Utah and Nevada would also be significant. Implementation of erosion control, restoration, and revegetation guidelines would help to stabilize many of the areas. The Mojave Desert region, due to low rainfall, may take many years before vegetation would be adequately recovered. Similar problems with revegetation may occur in the Middle Rocky Mountains region primarily due to steep slopes, although well-designed erosion control plans should alleviate most of the problems.

The proposed route would cross 135 intermittent and perennial streams. A total of 52 perennial stream crossings would be necessary. Thirty-nine of these stream crossings would have moderate to high significance due to channel gradient, stream bed characteristics, and sideslope. Even if mitigation measures were applied, it is likely that some level of increased sediment loading would continue for a period after construction was completed. The largest number of these sensitive stream crossings would occur in the Middle Rocky Mountains region.

There would be approximately 126 miles of potential impacts to groundwater resources along the proposed route. These impacts would be distributed within the Wasatch and Tehachapi Mountains, Mojave River valley, and Las Vegas Wash. It is unlikely that impacts to groundwater would be significant if the mitigation measures outlined are adhered to.

The Kern River proposed route would have significant impacts to 13 stream crossings in terms of freshwater biology. Principal impacts on aquatic environments would result from construction and include increased sedimentation, substrate removal, and habitat alteration. All of the sensitive stream crossings would occur in the Middle Rocky Mountains region between MP 44-185. Mitigation measures which reduce the amount of sediments introduced to the streams and avoid critical fish spawning times could greatly reduce the amount of overall impact.

The proposed route would temporarily disturb 10,207 acres of native vegetation and may impact the blackbrush scrub and the lowland saltbush scrub communities. The blackbrush scrub vegetation type represents a select community which may be

impossible to revegetate to pre-construction conditions. In addition to these communities, Joshua trees and cactus which are scattered in the creosote and saltbush vegetation types may also be adversely affected. The proposed route would keep 4,201 acres of woody vegetation permanently cleared from the operational ROW. Due to the low revegetative potential along many portions of the proposed route, woody plant species may not reoccur for well over 50 years. Construction of the pipeline would also impact approximately 98 acres of riparian habitat.

The proposed route would impact no federally threatened or endangered plant species. However, four California state listed plant species could be impacted. This plant habitat occurs along 470 acres of the route.

In addition to the impacts to native vegetation, the proposed route would temporarily disturb 1,561 acres of agricultural land, primarily in the Basin and Range region and the San Joaquin Valley. These impacts would not last over one agricultural season. The route would also permanently remove 242 acres of orchards and vineyards from production in the San Joaquin Valley.

The proposed route would significantly impact 1,350 acres of big game crucial or high priority habitat primarily between MP 0 and 390. The route would also affect 162 acres of big game migration corridors primarily in the Middle Rocky Mountains region. Approximately 404 acres of sensitive upland game bird habitat would be impacted by the proposed action particularly in the Basin and Range and Mojave Desert areas.

Sixty acres of crucial waterfowl nesting areas would be impacted in the Basin and Range area. A total of 11 known raptor nests along the route could be significantly affected.

In addition to impacts to wildlife, 8,667 acres of potential habitat of threatened or endangered wildlife species would be adversely affected including the California condor (1,900 acres), black-footed ferret (600 acres), and Mojave ground squirrel (850 acres), and desert tortoise (3,716 acres). Table 1.4-1 lists habitat acreages suitable for other species of special concern which would be impacted.

The Kern River construction workforce would place a significant but temporary demand on housing and campgrounds in areas of central and southern Utah, southern Nevada, and San Bernardino County in California. This would inconvenience travelers and campers seeking accommodations if the construction period occurred during the tourist season. Property tax revenues would increase more than 10 percent in seven counties crossed by the pipeline.

The proposed route would have no significant impacts to traffic since major roads along the route would be crossed by boring beneath paved roads. Noise impacts caused by construction would

be temporary in nature and would only occur during working hours. Since the majority of the proposed route would be constructed in relatively uninhabited areas, noise resulting from construction would not present a significant problem. Noise resulting from compressor station operation is expected to be below an Ldn of 55 dBA at nearby noise sensitive areas.

There is no vehicle access into most of the mainline route from MP 110 to 142. New roads would have to be approved by the Forest Service prior to construction. In several areas, new roads would cause unavoidable adverse impacts to soils, land stability, and other watershed values. The Forest Service may deny approval of new roads in these areas and specify helicopter supported construction.

The proposed route would conflict with the operation of five recreation areas. Most of these impacts would be temporary in nature. Construction activities could adversely affect competition for camping space in developed campgrounds in the Wasatch-Cache and Uinta National Forests, particularly if construction takes place between May and October. There would also be impacts to the Rainbow Gardens Natural Area and the proposed Clark County Wetlands Park in the Las Vegas Wash during the construction period in the form of increased traffic, vegetation disturbance, water quality degradation, and disruption of the natural visual quality. While most of these impacts are expected to be short-term, visual disruption would be permanent in the Rainbow Gardens. Finally, the Pacific Crest National Scenic Trail may experience temporary disturbance during construction in the form of interruption or delay of traffic, disturbance of vegetation and soils, and disruption of the natural visual quality.

The proposed action would conflict with the Utility Corridor Rule as presented in the Forest Land and Resource Management Plan for the Uinta National Forest. Construction along the proposed route would violate the intent of the plan in designating lands suitable for utility corridors. Similar significant impacts occur to the BLM resource areas of House Range, Warm Springs, and Cedar-Beaver-Garfield-Antimony. The proposed route would not be within the established utility corridors in these resource areas. The BLM policy is to follow established corridors wherever possible. However, the most significant conflict would occur with the Sunrise Mountain ISA because BLM cannot issue a ROW grant for an activity which would permanently alter this area.

The proposed action is not in compliance with the Master Plan for the proposed Clark County Wetlands Park. The route would also conflict with land use plans for the cities of East Las Vegas and Henderson, Nevada.

The Kern River route would encounter two 25-mile long segments with a very high cultural resources sensitivity rating and seven

segments with a high sensitivity rating. Compliance procedures, however, should provide adequate mitigation to potential impacts.

Approximately 6,119 acres of significant paleontological formations would be crossed by the proposed route. If adequate mitigation measures are implemented, the potential impacts to paleontological resources should be much lower.

Approximately 510 acres of the route would have highly significant impacts to visual quality. The majority of these impacts would occur in the Uinta National Forest; the remainder are dispersed along the route.

1.4.2 Kern River Wasatch Variation

The Kern River route with the Wasatch Variation would entail construction of 860 miles of pipeline. The Wasatch Variation would avoid crossing approximately 100 miles of rugged, mountainous terrain which would be traversed by the proposed route. It also avoids crossing the Uinta National Forest. The variation is approximately 154 miles in length versus 131 miles along the portion of the proposed route it would replace. The variation diverges from the proposed route at approximately MP 73 and would rejoin at MP 204.

Wasatch Variation impacts would be identical to those of the proposed route or insignificantly differ for the following resource areas: air quality; orchards and vineyards permanently removed; traffic and noise; and number of high cultural resource sensitivity segments.

This variation would encounter the Wasatch Fault in a potentially more hazardous location than the proposed route. Also, an additional area of faulting (the West Valley Fault Zone) would be crossed by the Wasatch Variation. The variation would cross 33 miles of areas with potential landslide activity, as opposed to 66 miles for the portion of the route it would replace.

The variation would also impact 44 miles of land containing slopes greater than 30 percent, compared to 61 miles along the portion of the route it replaces.

The Wasatch Variation would cross 703 acres of soils having poor reclamation potential, 867 fewer than the proposed portion of the route.

The Wasatch Variation would encounter 46 stream crossings, an increase of six over the portion of the mainline it would replace. This increase primarily occurs to intermittent stream crossings, where 20 additional crossings were encountered. Impacts to perennial streams would decrease to 16 from the 30 identified along the proposed route. Impacts to perennial streams with moderate to high significance also decreased to 12,

12 fewer than the proposed route portion. Although there would be a reduction in the number of streams impacted, the magnitude of unavoidable adverse impacts would be greatest in this variation because of municipal watersheds and adjacent urban populations.

Groundwater impacts along the Wasatch Variation would occur along 48 miles in the Wasatch Mountains, about four miles less than the portion of the proposed route it would replace.

Impacts to freshwater biology with regard to the number of sensitive stream crossings containing fish would decrease by six to a total of six significant stream crossings if this variation were adopted.

Approximately 1,280 acres of native vegetation would be temporarily disturbed on the Wasatch Variation, 296 fewer than would be impacted by the proposed action. The variation, however, would impact 290 acres of woody vegetation which would be permanently removed. This is 322 fewer than the proposed action.

This variation would potentially impact 125 acres of riparian habitat compared to 61 acres on the portion of the proposed route it would replace. The variation would also temporarily disturb 425 acres of agricultural land, 287 more than the proposed route segment.

The variation would significantly impact 493 acres of big game critical or high priority habitat versus 688 along the proposed route. The variation would affect no big game migration corridors, as opposed to the 77 acres which would be impacted by the proposed route. Approximately 24 acres of upland game bird sensitive habitat would be affected by the variation. This is 24 more acres than the proposed action. Twenty-two acres of critical waterfowl nesting areas would be affected by the variation, 14 fewer than the proposed route. A total of seven known raptor nests would be impacted by the variation, three more than the proposed route.

Approximately 65 acres of potential habitat of federal threatened or endangered wildlife species would be affected by the variation. This is 65 more than the proposed route. These 65 acres would affect bald eagle winter concentration areas.

Impacts to socioeconomics would be similar to those discussed for the proposed action, although different counties in Utah would be involved. The Wasatch Variation within the Wasatch-Cache National Forest is inaccessible by vehicle. New roads would have to be approved by the FS prior to construction. In several areas of steep rugged terrain, new roads would cause unavoidable adverse impacts to soils, land stability, and other watershed values. The FS may deny approval of new roads in these areas and specify helicopter supported construction. These impacts could also occur along the replaced portion of the mainline.

Impacts to recreation facilities would be similar to the proposed action although impacts to campgrounds in the Uinta National Forest would not occur. These areas would be replaced by impacts to the developed picnic area at Mueller Park and to campgrounds in Wasatch-Cache National Forest along City Creek. These impacts would be confined to the construction phase.

Use of the Wasatch Variation would resolve the conflict with the Standards and Guidelines for Utility Corridors for the Uinta National Forest; however, the variation would conflict with the Utility Corridor Rule for a small section of the Wasatch-Cache National Forest. In addition, the Wasatch Variation has the potential to result in conflicts with existing residential development in the Salt Lake Valley. The remaining land use conflicts associated with the proposed route would still be applicable.

No high sensitivity cultural resource segments are present in either the variation or the replaced portion of the route.

The variation has the potential to impact 1,716 acres of land containing significant paleontological formations. This is 940 more than the proposed route.

The Wasatch Variation would have 28 acres of high significance impacts to visual resources as opposed to the 173 acres along the proposed route it would replace.

1.4.3 Kern River West Strawberry Variation

The Kern River route with the West Strawberry Variation would involve construction of 844 miles of new pipeline. The West Strawberry Variation was identified as an alternative to construction in some of the same rugged terrain avoided by the Wasatch Variation. The variation would add about seven miles to the 57-mile long segment of the proposed route it replaces between MP 119 and 176.

West Strawberry Variation impacts would be identical to those of the proposed route or insignificantly different for the following resource areas: air quality; number of surface faults; overall number of stream crossings; areas of agricultural land temporarily disturbed; acres of big game migration corridors and waterfowl critical nesting areas; acres of threatened or endangered wildlife species habitat; socioeconomics, traffic, and noise; the number of high sensitivity cultural resource segments; and visual resources.

The variation would cross four miles of area with significant landslide potential. This is 34 fewer miles than the portion of the route it would replace. Significant landslide potential, however, exists along four miles of the West Strawberry Variation

and stringent mitigation measures to prevent slides must be adhered to. The variation would also impact 23 miles of land containing slope greater than 30 percent. These areas are indicative of slope stability and revegetation problems. This is 19 fewer miles than the proposed route segment.

The variation would impact 218 acres of soils with a poor potential for reclamation. This would be 594 fewer of disturbance than the proposed Kern River route it would replace.

Surface water impacts would increase by one over the proposed action. Although impacts to moderate to high significance stream crossings would decrease by four, the significance of the impacts, particularly where the route parallels the Strawberry River, would be far more significant than in the portion of the route it would replace.

Groundwater impacts along the West Strawberry Variation would increase by about eight miles from the 56 miles of potential impact that it would replace along the proposed route.

Impacts to freshwater biology with regard to the number of sensitive stream crossings would decrease by four, resulting in only one significant stream crossing. That stream contains a Class B fishery.

The variation would temporarily disturb 780 acres of native vegetation, 65 more than the proposed route. The variation, however, would impact 10 fewer acres of woody vegetation which would be permanently removed for the life of the project. The variation would impact 285 acres versus the 295 for the proposed action. The variation would potentially impact 105 acres of riparian habitat as opposed to 25 along the proposed route. The West Strawberry Variation would potentially impact one federally listed endangered plant species as opposed to none on the proposed route segment. It would impact one acre of federally listed plant species habitat, one more acre than the proposed route.

The variation would significantly impact 282 acres of big game critical or high priority habitat versus the 397 along the proposed route. The West Strawberry Variation would impact 50 acres of big game fawning/calving areas and 164 acres of upland game bird sensitive habitat compared to 0 and 40 acres, respectively, associated with the proposed route. Five raptor nesting areas have been identified along the variation, one more than the portion of the proposed route it would replace.

New roads on FS lands would require approval by the FS. In several areas on steep rugged terrain, new roads would cause unavoidable adverse impacts to soils, land stability, and other watershed values. The FS may deny approval of new roads in these areas and specify helicopter supported construction.

Impacts to recreational facilities would be similar to those discussed for the proposed route. The recreation complex on the west side of Strawberry Reservoir would receive temporary impact during construction in the form of increased noise, traffic delays, and competition for camping space in the designated campground near the reservoir.

The West Strawberry Variation would cause the same types of land use conflicts as were discussed for the proposed action. The variation itself is not within an existing utility corridor where it traverses the Uinta and Manti-LaSal National Forests and conflicts with rules for placement of utility corridors.

The Kern River route with the West Strawberry Variation has the potential to impact 602 acres of land containing significant paleontological formations. This is 155 acres more than would be impacted in the proposed route.

1.4.4 Kern River Salt Creek Canyon Variation

The Kern River route with the Salt Creek Canyon Variation would involve construction of 839 miles of pipeline. The variation was developed as a canyon/valley construction alternative to Kern River's proposed crossing of the northern tip of the San Pitch Mountains. The variation is 14 miles long versus 12 miles along the portion of the proposed route which it would replace. The variation is located between MP 180 and 192.

Salt Creek Canyon Variation impacts would be identical to those of the proposed route or insignificantly different for the following resource areas: air quality; number of surface faults; acres of poor reclamation potential soils; groundwater; acres of riparian habitat; acres of big game migration corridors and habitat for sensitive upland game birds; socioeconomics, traffic, noise and recreation; land use; cultural and paleontological resources; and visual resources.

The variation would cross four miles of land with significant landslide potential, compared with eight encountered on the proposed route. The variation would not impact any land containing slopes greater than 30 percent, which are indicative of slope stability and revegetation problems. This figure is six miles less than would occur along the proposed route.

Surface water impacts caused by crossing intermittent and perennial streams would occur once; six fewer than the proposed route segment. Two fewer perennial streams would be crossed and three fewer significant stream crossings would occur.

Impacts to freshwater biology with regard to the number of sensitive stream crossings would occur one time compared with two.

The Salt Creek Canyon Variation would temporarily disturb 170 acres of native vegetation, 24 fewer than the proposed action. The variation would also permanently remove 12 acres of woody vegetation from the operational ROW for the life of the project. This is 33 fewer than the proposed route. The variation would temporarily impact 145 acres of cropland, 67 more than the proposed route.

The Salt Creek Canyon Variation would significantly impact 12 acres of big game critical or high priority habitat versus 75 acres along the proposed route.

No critical nesting areas for waterfowl would be impacted by the variation as opposed to the 36 acres impacted by the portion of the replaced proposed route. Two additional raptor nesting areas were identified within the Salt Creek Canyon Variation, compared to none along the proposed route.

A bald eagle winter roost was identified within the Salt Creek Canyon Variation.

1.4.5 Kern River North Las Vegas Variation

The Kern River route with the North Las Vegas Variation would involve 850 miles of pipeline construction. The variation was developed as an alternative to crossing the Rainbow Gardens, Las Vegas Wash, and the Sunrise Mountain ISA. This variation utilizing the Goodsprings Spur would require 109 miles of pipeline compared to 96 miles from the corresponding segment of the proposed route. The variation would depart the proposed route at MP 438 and rejoin it at MP 534.

North Las Vegas Variation impacts would be identical to those of the proposed route or insignificantly different for the following resource areas: air quality; number of surface faults and landslide potential; perennial streams; plant species of special concern and their habitat; agricultural lands; big game critical habitat; upland game bird sensitive and waterfowl critical nesting habitat; number of raptor nests; groundwater; freshwater biology; and socioeconomics, traffic, and noise.

The North Las Vegas Variation would cross eight miles of land with slope greater than 30 percent, three more than would occur along the proposed route.

The variation would impact 1,236 acres of soils with a poor potential for reclamation. This is 309 acres more than would occur along the proposed route and is directly attributable to the differences in mileage between the variation and the proposed route since reclamation potential in Nevada is generally poor.

Surface water impacts would increase by six with 13 stream crossings on the variation as opposed to only seven along the

segment of the route it would replace. These additional crossings would occur on intermittent streams only.

Potential groundwater impacts at Las Vegas Wash would be avoided.

The variation would temporarily disturb 1,320 acres of native vegetation, 156 more than would occur on the proposed route. One hundred twenty-one additional acres of woody vegetation would be disturbed on the North Las Vegas Variation and 14 fewer acres of riparian habitat would be impacted. Temporary impacts to agricultural land would be similar to those discussed for the proposed action with two fewer acres disturbed.

No big game migration corridors would occur along the variation, compared with 37 acres of migration corridors along the proposed route section it would replace.

The variation could potentially impact 424 acres of habitat for federally threatened and endangered wildlife species, 30 fewer acres than the proposed action. These 30 fewer acres of impacts would occur to desert tortoise habitat.

Impacts to recreational facilities would be similar to those discussed for the proposed action. The variation would have both long and short-term impacts to Off-Road Vehicle Recreation Area 13 near Goodsprings, Nevada. This impact would replace the potential impacts to the Rainbow Gardens Natural Area and the proposed Clark County Wetlands Park on the proposed route.

Utilization of the North Las Vegas Variation would avoid the land use conflicts associated with the Sunrise Mountain ISA, the Clark County Wetlands Park at Las Vegas Wash, and the conflicts with the East Las Vegas and Henderson, land use plans. The North Las Vegas Variation, however, could impact Nellis AFB. Use of the North Las Vegas Variation would also avoid the Rainbow Gardens Natural Area as well as avoid crossing the Las Vegas Wash.

The variation has one highly sensitive cultural resources segment as opposed to none for the proposed route.

The North Las Vegas Variation has the potential to impact 1,305 acres of significant paleontological formations. This is 181 acres more impact than would occur along the proposed route.

Impacts to visual resources would be reduced by 76 acres because this variation would avoid construction through the Rainbow Gardens and the Las Vegas Wash areas.

1.4.6 Kern River Henderson Variation

The Kern River route with the Henderson Variation would require approximately 839 miles of new pipeline construction. The Henderson Variation was developed to minimize impacts to large

areas of undeveloped, subdivided tracts within the corporate limits of the City of Henderson, Nevada. The variation would parallel existing roads along its entire route. Total length of the variation is 15 miles, approximately two miles longer than the portion of the proposed route which it would replace. The variation would depart from the proposed route at MP 496 and rejoin it at MP 511.

Henderson Variations impacts would be identical to those of the proposed route or insignificantly different for the following resource areas: air quality; surface faults, miles of landslide potential, and miles of slope greater than 30 percent crossed; high significance perennial stream crossings; groundwater; freshwater biology; riparian habitat; agricultural lands; all wildlife habitat criteria; socioeconomics, traffic and noise; cultural and paleontological resources; and visual resources.

This variation would impact 170 acres of soils with a poor reclamation potential. This is an increase of 49 acres of disturbance over the proposed route.

No impacts to stream crossings would occur on the variation, two fewer than the proposed route segment it would replace. This difference would occur in intermittent stream crossings.

The variation would temporarily disturb 190 acres of native vegetation, 49 more acres than would be disturbed by the proposed route. Approximately 95 acres of woody vegetation would be permanently cleared from the operational ROW. This is 71 acres more disturbance to woody vegetation than would occur along the proposed route.

1.4.7 Kern River North Bakersfield Variation

The Kern River route with the North Bakersfield Variation would involve construction of 839 miles of new pipeline. The variation was developed in an attempt to substantially reduce pipeline mileage in the San Joaquin Valley. The total variation length would be 111 miles compared with the 108 miles for the corresponding portions of the proposed route. The variation would depart from the proposed route at MP 722, rejoin the route at the end of the Taft Lateral (MP 47.58) and continue along the Taft Lateral to MP 30T.

North Bakersfield Variation impacts would be identical to those of the proposed route or insignificantly different for the following resource areas: air quality; high significance perennial stream crossings; freshwater biology; number of California listed plant species; all wildlife habitat criteria except threatened or endangered species; socioeconomics, traffic and noise; and visual resources.

The variation would encounter at least four surface fault rupture areas, two less than would occur on the proposed route. The variation would encounter 10 miles of potential landslide areas, eight more miles than would occur on the proposed route. The variation, however, would encounter 29 miles with slope greater than 30 percent. This would be 19 more miles of potentially unstable slopes and areas with more difficult revegetation problems.

The variation would impact 242 acres of soils with poor reclamation potential, 82 more than would occur along the proposed route.

Surface water impacts would increase by ten over the proposed action. The ten additional stream crossings would be intermittent streams.

The variation could impact 36 miles of groundwater resources, compared with only 30 miles of impacts to the portion of the route it would replace.

The variation would temporarily disturb 1,350 acres of native vegetation; this is 343 acres more disturbance than would occur on the proposed route. The variation would impact 210 acres of woody vegetation, 121 more than would occur on the proposed route. Impacts to riparian habitat would occur on one acre compared to none along the proposed route. The variation could impact one California state listed plant species with the potential to disturb 82 acres of habitat. This is an increase of 41 acres over the proposed route.

The variation could potentially impact 2,946 acres of habitat for federally threatened or endangered wildlife species. This is an 325-acre increase over the proposed route. These increases in potential habitat disturbed would occur to the California condor, blunt-nosed leopard lizard, Tehachapi slender salamander, San Joaquin kit fox, Tipton kangaroo rat, short-nosed kangaroo rat, and Nelson's antelope squirrel. Table 1.4-1 lists the specific acreage impacts to each species of special concern.

No high sensitivity cultural resource segments would be encountered along the variation, while the portion of the route it replaces has one sensitive segment.

The variation would potentially impact 556 acres of significant paleontological formations. This would represent an increase of 511 acres over the proposed route.

1.4.8 The Kern River Proposal Best Case

Based on the foregoing, the next step in the review process involved determining the best available route for the Kern River proposal. This decision was made by comparing all of the data

listed in Table 1.4-1 and deciding which of the Kern River variations would have the least impact to the physical and social environment.

Impacts to air quality associated with either the proposal or any of the variations would not be significant.

Impacts to geology would be quite different along the proposed action and the variations. These differences in impacts would be significant in some instances, particularly along the proposed route in the Wasatch Mountains and Uinta NF. All of the routes examined would encounter a minimum of 18 potential fault rupture areas and a maximum of 21. The most important concerns with regard to geology impacts, however, revolve around miles of potential landslide areas and miles of slope greater than 30 percent. These concerns would significantly affect the potential for severe impacts causing rupture of the line and/or impacts to slope stability in the areas around the route. Utilizing these two impact categories, the Wasatch and West Strawberry Variations are clearly the environmentally superior route. Differences between the Wasatch and West Strawberry Variations would be in differences of degree, with the Wasatch Variation having less potential to be affected by major recurring landslides over the life of the project. Slope instability along the Wasatch Front portion of the variation has a greater potential to affect public safety than the proposed route. The potential for seismic soil liquefaction is also greater along the Wasatch Variation than the proposed route. There may be a greater potential for landsliding along the North Bakersfield Variation than the proposed route.

Impacts to soils would also occur along all of the routes. The Wasatch Variation, despite the increased length, would result in fewer impacts to soils with poor reclamation potential than the proposed action or any of the other variations. Of the other variations, only the West Strawberry would reduce the miles of poor reclamation soils associated with the proposed route.

Surface water impacts would vary significantly along the proposed action and the variations. The most pertinent categories of impacts listed in Table 1.4-1 would be to perennial stream crossings and moderate/high significance stream crossings. Using these two categories, the Wasatch Variation would have the least number of impacts to surface water resources. This statement would also hold for impacts to freshwater resources with regard to disturbance of aquatic species. The North Las Vegas Variation would avoid crossing Las Vegas Wash.

Impacts to groundwater are essentially similar for all of the routes. Using the West Strawberry Variation, however, would cause the greatest impacts to groundwater. The Wasatch and North Las Vegas Variations would cause slightly less impact than any of the other routes.

Impacts to vegetation have been divided into two subcategories: native vegetation disturbance and impacts to threatened or endangered plant species. Impacts to native vegetation would be generally dependent on the miles of construction. The figures listed in Table 1.4-1 indicate that the Salt Creek Canyon Variation would have the fewest impacts to native vegetation. Impacts to federally listed plant species would be roughly equal along all but the West Strawberry Variation where one federally endangered plant species would be encountered.

Wildlife impacts have also been divided into two subcategories: general wildlife disturbance and disturbance to threatened or endangered species. Impacts to general wildlife species would affect all of the routes. The fewest impacts to general wildlife species would occur along the Wasatch Variation. Use of the North Las Vegas Variation would also reduce general wildlife impacts.

Impacts to threatened or endangered species habitat would be almost equal on all of the routes with the exception of the North Bakersfield Variation. This variation would impact almost 325 more acres of sensitive wildlife habitat. The North Las Vegas Variation would impact the fewest number of acres of sensitive wildlife habitat by approximately 30 acres.

Socioeconomic impacts would be insignificant along all of the routes. However, the North Las Vegas Variation would cause fewer impacts to recreation than any of the other routes.

Land use impacts would be reduced significantly along the Wasatch, Henderson, and North Las Vegas Variations. The Wasatch Variation would reduce conflicts with the Uinta National Forest Land and Resource Management Plans with regard to the placement of pipelines outside of established utility corridors. The North Las Vegas Variation would avoid land use conflicts with the Sunrise Mountain ISA, Rainbow Gardens, the proposed Clark County Wetlands Park, and the towns of Henderson and East Las Vegas. The Henderson Variation would eliminate conflicts with the town of Henderson.

Cultural resource impacts are difficult to determine prior to completion of a Class III inventory survey. The West Strawberry and North Bakersfield routes would directly impact fewer sites than any of the other routes based on the current state of knowledge. All of the routes have the potential to impact at least four NRHP sites. Based on high sensitivity segments the North Bakersfield route would be slightly better than the remaining routes.

Paleontological impact would be less severe along the proposed route and Henderson Variation.

Significant visual impacts would occur along all of the routes. The Wasatch Variation, however, would impact fewer acres than either the proposed action or any of the other variations.

Based on all of the data presented, the proposed action utilizing both the Wasatch and North Las Vegas Variations would result in fewer significant impacts than either the proposed action or any of the other variations.

The Wasatch Variation would cause the least impacts to geology, soils, surface water, groundwater, freshwater biology, general wildlife, and visual resources. The North Las Vegas Variation would cause the fewest impacts to recreation and land use.

In combination, the Wasatch and North Las Vegas Variations represent a route with the fewest impacts to the largest number of the categories discussed. These variations avoid or reduce a number of significant impacts which would occur along the proposed routes. They also provide a route which should remain stable from a geologic perspective and cause the fewest impacts to land management decisions of both federal, state, and county governments. The staff therefore recommends utilization of these two variations over the proposed portions of the mainline route.

1.5 INTERSTATE SYSTEMS COMPARISONS

This portion of the comparison deals with the best case scenarios of each of the three interstate pipeline proposals. As stated in Section 1.2.6, the Mojave System C with Alternative B represents the environmentally preferable routing for Mojave. This system includes the 100 MMcfd case for Northwest, the 100/500 MMcfd case for El Paso, and the Mojave proposal. This route would entail construction of 591 miles of pipeline. The El Dorado routes were compared in Section 1.3.7. Since the El Dorado pipeline proposal would receive gas in the same manner as the Mojave proposal, the System C route discussed above represents the best system routing. This El Dorado route would entail construction of 585 miles of pipeline.

The Kern River proposal and variations to the proposed route were compared in Section 1.4.8. This comparison indicates that the Kern River route utilizing both the Wasatch and North Las Vegas Variations represents the environmentally best route. The Kern River routing would entail 865 miles of pipeline construction.

All of the routes in this comparison, therefore, would require somewhere between 585 and 865 miles of pipeline across a multitude of terrain, geologic, vegetative, and wildlife habitat types. The main categories for comparisons of the route remain unchanged from those discussed above. Table 1.5-1 lists the impacts for each of the routes.

Table 1.5-1

INTERSTATE SYSTEMS COMPARISONS

	Mojave System C 1/ with Alternative B	El Dorado 2/ System C	Kern River with Wasatch and North Las Vegas Variations
AIR QUALITY	NSI 3/	NSI	NSI
GEOLOGY			
Surface fault rupture	10	10	21
Miles of landslide potential	14	14	68
Miles of slope greater than 30%	75	87	215
SOIL			
Acres of poor reclamation potential	3483	3052	4324
SURFACE WATER			
Number of stream crossings	68	61	147
Intermittent stream crossings	65	58	109
Perennial stream crossings	3	3	38
Moderate/high significance perennial stream crossings	0	0	27
GROUND WATER			
Miles of potential impact	90	104	121
FRESHWATER BIOLOGY			
Number of sensitive stream crossings with fish present	0	0	7
TERRRESTRIAL BIOLOGY			
Vegetation			
Total acres of native vegetation temporarily disturbed	7292	7186	10067

Table 1.5-1 (continued)
INTERSTATE SYSTEMS COMPARISONS

	Mojave System C 1/ with Alternative B	El Dorado 2/ System C	Kern River with Wasatch and North Las Vegas Variations
Vegetation (continued)			
Acres of woody vegetation kept cleared for the life of the project	1774	1797	4000
Acres of riparian habitat crossed	60	24	148
Acres of federally threatened or endangered plant species affected	0	0	0
Number of species	0	0	0
Acres of California classified plant species affected	947	947	470
Number of species	3	3	4
Acres of agricultural land temporarily disturbed	731	489	1846
Wildlife			
Big game crucial or high priority habitat (acres)	448	448	1155
Big game migration corridors (acres)	121	121	48
Big game fawning/ calving areas (acres)	0	0	0
Upland game bird sensitive habitat (acres)	24	24	428
Critical waterfowl nesting areas (acres)	0	0	46
Raptor nesting areas (nests)	0	0	14
Acres of potential threatened or endangered animal habitat affected	10414	9352	8684

Table 1.5-1 (continued)

INTERSTATE SYSTEMS COMPARISONS

	Mojave System C 1/ with Alternative B	El Dorado 2/ System C	Kern River with Wasatch and North Las Vegas Variations
Wildlife (continued)			
Yuma clapper rail	139	85	0
Bald eagle	175	157	168
Peregrine falcon	163	163	0
Whooping crane	0	0	0
California condor	1694	1730	1900
Blunt nosed leopard lizard	520	388	339
Tehachapi slender salamander	18	0	0
Desert tortoise	3274	2998	3716
San Joaquin kit fox	943	533	351
Black-footed ferret	1567	1567	600
Utah prairie dog	0	0	0
Mojave ground squirrel	727	702	850
Nelson's antelope squirrel	412	363	290
Tipton kangaroo rat	24	97	30
Short-nosed kangaroo rat	410	436	290
Giant kangaroo rat	300	133	180
SOCIOECONOMICS			
Population change >10%	No	No	No
Total employment change >10%	No	No	No

Table 1.5-1 (continued)

INTERSTATE SYSTEMS COMPARISONS

	Mojave System C [1] with Alternative B	El Dorado [2] System C	Kern River with Wasatch and North Las Vegas Variations
SOCIOECONOMICS			
Income change >10%	No	No	No
Vacancy rates of temporary housing <5%	Yes	Yes	Yes
Local tax base change >10%	1 county	1 county	7 counties
Traffic	NSI	NSI	NSI
Operational Noise	NSI	NSI	NSI
Recreation (conflicts)	5	2	5
LAND USE/OWNERSHIP			
conflicts	8	6	5
CULTURAL RESOURCES			
Number of sites in the direct impact zone	88	97	81
NRHP listed or eligible sites in the direct impact zone	4	4	4
Percentage of line actually surveyed or survey coverage within analysis corridor	12	15	6
High sensitivity segments	9	9	10
PALEONTOLOGY			
Acres of impact to significant formations	2572	2456	7240
VISUAL RESOURCES			
Acres of high visual impact	0	318	289

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[1] Mojave System C = Mojave/El Paso (100/500)/Northwest (100)

[2] El Dorado System C = El Dorado/El Paso (100/500)/Northwest (100)
Alternative B keeps Mojave within the desert corridor near Barstow, California

[3] NSI = No Significant Impacts

Impacts to air quality would be roughly equivalent for all three interstate systems. The El Dorado proposal involves two new compressor stations, while the Mojave and Kern River systems would require three each.

Impacts to geology would be equivalent for the Mojave and El Dorado systems based on miles of landslide potential and the number of surface fault ruptures. The Mojave system route, however, would have 12 fewer miles of slope greater than 30 percent than the El Dorado route. The Kern River route, on the other hand, would cross 20 faults, 68 miles of areas with landslide potential, and would traverse 215 miles of slope greater than 30 percent.

Soils impacts would be greatest on the Kern River system. This is due to a combination of more miles of slope greater than 30 percent and the generally poor revegetation potential caused by the climatic regime across Utah, Nevada, and California. The El Dorado route would encounter the fewest number of acres with poor reclamation potential. The Mojave proposal lies in the middle.

Impacts to surface water would vary significantly among the three routes. The Mojave and El Dorado systems would only cross three perennial streams and these crossings would not cause significant impacts. The Kern River route would cross 38 perennial streams; 27 of these stream crossings have the potential to be significantly impacted. Some of these impacts can be successfully mitigated; however, it is doubtful that all of the impacts can be mitigated.

The Kern River route would have the greatest number of miles of impacts to groundwater (122). The Mojave route could potentially impact 90 miles of sensitive groundwater areas and the El Dorado route could potentially impact 104 miles of sensitive groundwater areas. As stated previously, significant impact to groundwater is very unlikely.

Impact to aquatic species would only occur on the Kern River route. Seven sensitive stream crossings would be significantly impacted. Although some mitigation measures may be taken to reduce these impacts, the mitigation measures would not be sufficient to reduce the impacts to insignificance.

Impacts to native vegetation temporarily disturbed would vary from a low of 7,186 acres for El Dorado to 10,067 acres for Kern River (see Table 1.5-1). Permanently removed woody vegetation for the routes would be distributed in a similar manner. The Kern River route would impact 4,000 acres while the Mojave and El Dorado routes would remove 1,774 and 1,797 acres respectively. Significant differences, however, exist among the routes with regard to acres of riparian habitat crossed. The El Dorado route would cross 24 acres, the Mojave 60 acres, and the Kern River 148 acres.

None of the routes would impact any federally threatened or endangered plant species nor would they impact any suitable habitat of federally listed plant species.

The Kern River route does have the potential to impact four species of California listed plants and would pass through 470 acres of suitable habitat. The El Dorado and Mojave routes, on the other hand, could impact three California listed plant species, but would pass through 947 acres of suitable habitat.

The El Dorado route would temporarily disturb the least amount of agricultural land: 489 acres. Mojave would disturb 731 and Kern River would disturb 1,846 acres. All of these impacts, however, would represent a temporary disturbance, generally only during one growing season.

El Dorado would permanently affect 273 acres of orchards and vineyards. Kern River would permanently remove 242 acres of orchards and vineyards. The Mojave route would permanently remove 158 acres of orchards and vineyards.

Wildlife impacts have been divided into two subcategories: general wildlife disturbance and disturbance to threatened or endangered species. Impacts to general wildlife species would occur to big game critical habitat (448 acres), big game migration corridors (121 acres), and upland game bird sensitive habitat (24 acres) on both the Mojave and El Dorado routes. The Kern River route would impact big game critical habitat (1,155 acres), big game migration corridors (48 acres), big game upland game bird sensitive habitat (428 acres), critical waterfowl nesting areas (46 acres), and 14 raptor nests.

The Kern River route, although significantly impacting game species, has fewer impacts to threatened or endangered wildlife species. The Kern River route could impact 11 federal or California state listed species and would cross 8,684 acres of suitable habitat. The El Dorado route could impact 13 federal or California state listed species and could cross 9,352 acres of suitable habitat. The Mojave route could impact 14 federal or California state listed species and could cross 10,414 acres of suitable habitat.

Socioeconomic impacts would be roughly equivalent along all three of the routes. The Kern River route would have positive impacts to seven counties, increasing the tax base by more than 10 percent. One county would have a positive impact to the tax base on the Mojave and El Dorado routes. No significant impacts would occur on any of the routes concerning traffic or noise. The noise levels around the compressor stations for Kern River, Mojave, and El Dorado will add to the ambient noise levels.

Both the Kern River and Mojave routes could conflict with five recreational areas. The El Dorado route could conflict with three recreational areas.

The El Dorado route would conflict with land use plans on Edwards AFB. Mojave land use conflicts include the Edwards AFB conflict discussed above. In addition, the Mojave line is outside of the CDCA utility corridor between Pisgah and Boron. The Mojave route could also conflict with existing and planned development in the Stallion Springs residential community. Kern River land use conflicts include the non-use of the Ward Canyon Utility Corridor in Wasatch-Cache NF, and the non-use of utility corridors in BLM resource areas of House Range, Warm Springs, and Cedar-Beaver-Garfield-Antimony.

Cultural resource impacts are difficult to determine prior to completion of a Class III inventory survey. The Kern River route contains two 25-mile long segments with a very high sensitivity rating and eight segments with a high sensitivity rating. Mojave and El Dorado, on the other hand would have nine segments having a high sensitivity rating. The Kern River route would directly impact fewer known sites than either the Mojave or El Dorado routes (see Table 1.5-1). The Kern River route contains the same number of NRHP sites as the other two routes but the direct survey of the ROW is not as complete as for the other two lines. The El Dorado route has been surveyed at a higher percentage than any of the other routes.

Potential paleontological impacts would be less severe along the El Dorado route (2,456 acres) than either the Mojave (2,725 acres) or Kern River routes (7,240 acres).

Significant impacts to visual resources would only occur on the El Dorado and Kern River routes. The impacts on the Kern River route may require significant mitigation measures to reduce the impacts to acceptable levels.

Based on the data presented above, all three of the routes have environmentally superior components. The Mojave route would cause fewer significant impacts to geology, groundwater, and visual resources. The El Dorado route would cause fewer significant impacts to soils, and agricultural land. The Kern River route would cause fewer significant impacts to threatened and endangered plants and wildlife. El Dorado and Mojave would cause similar impacts to freshwater biology, general game species wildlife, surface water, general vegetation, and paleontology, but significantly less impact than Kern River. There would be no significantly different impacts on socioeconomics or cultural resources among the three projects.

2.0 INTRASTATE SYSTEM ALTERNATIVES COMPARISON ANALYSES

2.1 THE INTEGRATED INTRASTATE SYSTEM ALTERNATIVE

Both PG&E and SoCal have presented flow diagrams indicating that under existing contract capacity, they have the capability of supplying at least 600 MMcfd from the California/Arizona border to the EOR market as an integrated intrastate system with no major additional facility requirements through 1994-1995. Although the intrastate companies have indicated that toward the end of the decade, they will require additional facilities to serve the fuel amount, this is probably also true for El Paso, Northwest, and Transwestern. This supply could be provided to PG&E and SoCal by Transwestern and El Paso utilizing expansions by looping similar to those described in their respective applications. Alternately, the entire quantity of gas could be transported by El Paso with essentially no Transwestern involvement. As noted in the discussion in the El Paso proposal, El Paso could also transport additional Canadian and/or Rocky Mountain gas transported by Northwest's pipeline system to El Paso at Ignacio, Colorado. Northwest may require between eight and 162 miles of looping to deliver 100 to 200 MMcfd.

If no additional gas is supplied by Northwest, then this system would require approximately 388 miles of pipeline, mostly looping, and 17,000 hp of compression. The facilities would include Transwestern's 356 miles of loop, El Paso's 15 miles of loop (0/400 case), the equivalent of the Mojave Transfer Line and the construction of a new 17,000 hp centrifugal compressor station on PG&E's system at Danby, California. This will be referred to as the Integrated Intrastate System A.

Another option would involve using System B which would entail 237 miles of pipeline construction and 40,000 hp of compression. This system would have 100 MMcfd being delivered to El Paso at Ignacio, Colorado, with an additional 500 MMcfd coming from west Texas.

System B would involve 212 miles of looping by El Paso (100/500 case), eight miles of loop by Northwest, 9,000 and 14,000 hp of compression on their two systems, respectively, the equivalent of the Mojave Transfer Line (17 miles), and the 17,000 hp of compression at Danby.

Table 2.1-1 provides a summary of impacts on the integrated intrastate system.

Table 2.1-1
INTRASTATE SYSTEMS ALTERNATIVES SUMMARY OF IMPACTS

	Integrated Intrastate		East Las Vegas Integrated	
	System A 1/	System B 2/	Intrastate	With Wasatch
AIR QUALITY	NSI 3/ 1 station	NSI 3 stations	NSI 4 stations	NSI 4 stations
GEOLOGY				
Surface fault rupture	2	3	11	12
Miles of landslide potential	14	50	86	53
Miles of slope greater than 30 %	44	19	202	185
SOIL				
Acres of poor reclamation potential	2545	841	3795	2928
SURFACE WATER				
Number of stream crossings	50	42	107	113
Intermittent stream crossings	48	40	55	75
Perennial stream crossings	2	2	52	38
Moderate/high significance perennial stream crossings	0	0	39	27
GROUND WATER				
Miles of potential impact	22	8	100	48
FRESHWATER BIOLOGY				
Number of sensitive stream crossings with fish present	0	0	13	7
TERRRESTRIAL BIOLOGY				
Vegetation				
Total acres of native vegetation temporarily disturbed	4917	1886	8088	8378
Acres of woody vegetation kept cleared for the life of the project	2453	1103	2690	2676
Acres of riparian habitat crossed	3	2	86	149
Acres of federally threatened or endangered plant species habitat affected	60	0	0	0
Number of species	1	0	0	0
Acres of California classified plant species affected	<470	<470	<470	<470

Table 2.1-1 (continued)
INTRASTATE SYSTEMS ALTERNATIVES SUMMARY OF IMPACTS

	Integrated Intrastate		East Las Vegas Integrated	
	System A 1/	System B 2/	Intrastate	With Wasatch
Vegetation (continued)				
Number of species	3	3	3	3
Acres of cropland temporarily disturbed	304	268	1355	1641
Wildlife				
Big game crucial or high priority habitat (acres)	663	363	1350	1155
Big game mitigation corridors (acres)	0	0	101	85
Big game fawning/ calving areas (acres)	0	0	0	0
Upland game bird sensitive habitat (acres)	0	24	404	428
Waterfowl critical nesting areas (acres)	0	0	60	46
Raptor nesting areas (nests) affected	0	0	11	14
Acres of potential threatened or endangered animal habitat	3511	3925	3417	3482
Yuma clapper rail	24	12	0	0
Bald eagle	24	12	121	186
Peregrine falcon	60	12	0	0
Whooping crane	0	0	0	0
California condor	327	327	327	327
Blunt-nosed leopard lizard	339	339	339	339
Tehachapi slender salamander	0	0	0	0
Desert tortoise	51	315	689	689
San Joaquin kit fox	557	557	557	557
Black-footed ferret	1345	1567	600	600
Mojave ground squirrel	0	0	0	0
Nelson's antelope squirrel	290	290	290	290

Table 2.1-1 (continued)
INTRASTATE SYSTEMS ALTERNATIVES SUMMARY OF IMPACTS

	Integrated Intrastate		East Las Vegas Integrated	
	System A 1/	System B 2/	Intrastate	With Wasatch
Wildlife (continued)				
Tipton kangaroo rat	24	24	24	24
Short-nosed kangaroo rat	290	290	290	290
Giant kangaroo rat	180	180	180	180
SOCIOECONOMICS				
Population change >10%	No	No	No	No
Total employment change >10%	No	No	No	No
Income change >10%	No	No	No	No
Vacancy rates of temporary housing <5%	Yes	Yes	Yes	Yes
Local tax base change >10%	Yes	Yes	Yes	Yes
Traffic	NSI	NSI	NSI	NSI
Operational noise	NSI	NSI	NSI	NSI
Recreation (conflicts)	0	1	2	1
LAND USE/OWNERSHIP				
Conflicts	2	4	8	7
CULTURAL RESOURCES				
Number of sites in the direct impact zone	41	52	57	60
NRHP listed or eligible sites	0	0	2	2
Percentage of line actually surveyed	6	8	<4	<4
High sensitivity segments	4	8	5	5
PALEONTOLOGY				
Acres of impact to significant formations	1650	1103	4904	5844
VISUAL RESOURCES				
Acres of high visual impact	0	0	310	165

1/ System A: El Paso 400 MMcfd Case and Transwestern
2/ System B: El Paso 600 MMcfd Alternative (100/500 Case) and Northwest 100 MMcfd Case
3/ NSI = No Significant Impacts

2.2 THE EAST LAS VEGAS/INTEGRATED INTRASTATE SYSTEM ALTERNATIVE

The East Las Vegas Alternative was suggested by the FERC staff as a possible means of reducing pipeline mileage associated with Kern River's proposed route between Las Vegas, Nevada, and Bakersfield, California. This alternative would follow the proposed Kern River route to a point north of Henderson, Nevada, at MP 491 and then extend due south to a point west of Camino, California; it basically would follow the route originally proposed by the Rocky Mountain Pipeline Project (RMPP).

The final 15 miles of this alternative would intersect major intrastate transmission facilities owned by SoCal and PG&E. The gas would be delivered to both of these systems which would operate in an integrated fashion using spare capacity to transport the gas 260 miles westward to the Bakersfield area. Use of the East Las Vegas Alternative would substitute 105 miles of pipeline construction between Las Vegas and the Camino area for the 271 miles proposed by Kern River. This would also assume that the California intrastate systems would need to construct delivery laterals in the Bakersfield area similar to the 75 miles of laterals proposed by Kern River. Again, the FERC staff has included the construction of a new 17,000 hp centrifugal compressor station on PG&E's system at Danby, California. Table 2.1-1 provides a summary of impacts on the East Las Vegas Integrated Intrastate System Alternative.

2.3 THE EAST LAS VEGAS/INTEGRATED INTRASTATE SYSTEM ALTERNATIVE WITH THE WASATCH VARIATION

This alternative would merge the Wasatch Variation with the East Las Vegas Integrated Intrastate System Alternative. This routing variation would eliminate some of the severe slope stability problems identified along the proposed mainline portions of the Kern River route in Utah between MP 70 and 185.

The same route discussed above would be followed from the end of the Wasatch Variation (MP 204) to the terminus of the East Las Vegas Alternative. Table 2.1-1 provides a summary of impacts on this alternative.

2.4 NORTHWEST/PGT/INTEGRATED INTRASTATE SYSTEM ALTERNATIVE

This alternative was developed by the FERC staff to explore the feasibility of providing the EOR/cogeneration industry with direct access to major sources of natural gas in western Canada and the southwest/southcentral United States by way of existing transmission systems without construction of a major new system as proposed by Kern River. The alternative would use two major gas transmission corridors linking production regions with the Bakersfield area. One corridor would extend south from Canada through Idaho, Washington, Oregon, and California along

interstate and intrastate pipelines owned by Northwest, PGT, and PG&E. The other corridor extends between west Texas and southern California using the pipeline systems owned by Transwestern or El Paso to interconnect with PG&E and SoCal at the California border.

This system alternative would not require additional facilities along either corridor; therefore, there are no impacts to enter in Table 2.1-1.

2.5 COMPARISONS OF THE INTRASTATE SYSTEMS

The impacts to the various intrastate systems were presented in Table 2.1-1. Since the Integrated Intrastate System has essentially been analyzed in both the Mojave (Section 1.2) and El Dorado (Section 1.3) sections and the equivalent of the System B route was determined to be the environmentally superior route, only the System B route will be discussed below.

Likewise since the East Las Vegas Integrated Intrastate System was essentially analyzed in Section 1.4 and the Wasatch Variation was determined to be a portion of the environmentally superior route, only the East Las Vegas Integrated Intrastate System with the Wasatch Variation will be discussed below.

The Northwest/PGT Integrated Intrastate System has not been previously analyzed, since it involves no facility construction. Because it involves no construction, it would involve no significant impacts. Therefore it is clearly environmentally superior and need not be compared below.

The air quality impacts for each of the intrastate system alternatives would conform with all applicable federal and state laws. The East Las Vegas system with the Wasatch Variation would require four new compressor stations, two more than the Integrated Intrastate System B.

Impacts to geology would vary along the two systems. The Integrated Intrastate System B would cross three surface faults, would cross 50 miles of potential landslide areas, and would traverse 19 miles of terrain with more than 30 percent slope. The East Las Vegas system with the Wasatch Variation would cross 12 faults, 53 miles of potential landslide areas, and 185 miles of slope greater than 30 percent.

Impacts to soils would occur along both of the system routes. The East Las Vegas system with the Wasatch Variation would have the greater impact, disturbing 2,928 acres, followed by the Integrated Intrastate System B with 841 acres of disturbance.

Surface water impacts would vary widely along the system routes. The most pertinent categories in Table 2.1-1 would be perennial stream crossings and moderate/high significance stream crossings.

Using these two categories, the East Las Vegas System with the Wasatch Variation would cross 38 perennial streams and would have significant impacts to 27 stream crossings. The Integrated Intrastate System B would cause no significant impacts to streams.

Impacts to groundwater vary widely among the routes. The Integrated Intrastate System B would be unlikely to cause any damage to groundwater followed by the East Las Vegas with the Wasatch Variation (48 miles). Since groundwater impacts can be easily mitigated, each of the systems would be acceptable.

Only the East Las Vegas System with the Wasatch Variation would have impacts to freshwater biology. This route would cause significant impacts to seven sensitive streams.

Impacts to vegetation can be divided into two subcategories: general vegetation disturbance and impacts to threatened and endangered plant species. Impacts to general vegetation would be generally dependent on the miles of construction (see Table 2. 1-1). Based on these figures the Integrated Intrastate System B route would have fewer impacts than the East Las Vegas System with the Wasatch Variation.

Impacts to threatened or endangered plant species would be in general more significant than those to general vegetation. The Integrated Intrastate System B route and the East Las Vegas Variation with the Wasatch Variation would not impact federally endangered plants and both would impact the same number of California state listed plants and plant habitat.

Wildlife impacts can also be divided into two subcategories: general wildlife disturbance and disturbance to threatened or endangered species. From a general wildlife perspective the Integrated Intrastate System B route would cause fewer impacts to wildlife game species than the East Las Vegas with the Wasatch Variation.

Impacts to threatened or endangered wildlife species would occur on both of the system routes. Except for the Yuma clapper rail, the East Las Vegas with the Wasatch Variation would have the potential for the same impact on each species as the Integrated Intrastate System B route.

Socioeconomic impacts would be minimal along both of the system routes. The East Las Vegas system with the Wasatch Variation would have beneficial impacts to seven counties with regard to changes in the county tax base. The Integrated Intrastate System B would have beneficial impacts to one county. No significant impacts would occur to traffic along either of the system routes.

The two systems would require either three or four new compressor station locations. System B would have less noise impact than the East Las Vegas system.

Conflicts to recreation facilities would occur along both the routes. These conflicts would be temporary in nature and should not occur beyond the construction phase.

Both of the routes would encounter land use conflicts. The Integrated Intrastate System B would have two land use conflicts. One concerns the Coconino NF Elden Environmental Study Area and the other involves potential residential development along the final eleven miles of the El Paso route. The Elden ESA problem could be solved by moving the loop.

Land use conflicts on the East Las Vegas route may be more difficult to resolve. A portion of the route in Nevada would cross through the Sunrise Mountain ISA. Until this ISA, which is not recommended for inclusion in the Wilderness Study Area program, has been formally removed from the list, an unavoidable land use conflict would occur. The route cannot be moved farther east or west and thus the East Las Vegas route cannot avoid the ISA.

Impacts to cultural resources are difficult to determine prior to the staking of the route. System B would contain eight 25 mile segments with a high sensitivity rating while the East Las Vegas System with the Wasatch Variation would contain two very high and three high sensitivity segments. The East Las Vegas System using the Wasatch Variation would impact at least 60 sites within the ROW as mapped. The Integrated Intrastate System B has the potential to impact 52 cultural resource sites. The East Las Vegas System could potentially affect two NRHP properties, as opposed to none on System B.

Impacts to paleontology would be less severe on the Integrated Intrastate System B than on the East Las Vegas system with the Wasatch Variation.

Finally, significant impacts to visual resources would not occur along the Integrated Intrastate System B. The East Las Vegas system with the Wasatch Variation would cause significant impacts to 165 acres of scenic areas.

Based on all of the data presented above, the Northwest/PGT Integrated Intrastate System would cause no significant impacts. This route would be far superior to any of the intrastate systems discussed above, since no construction would be required to transport natural gas into the California market.

The next best route would be System B, using the El Paso and Northwest system to deliver gas to PG&E or SoCal at the California/Arizona border. The main disadvantages to this route involve construction of new compressor stations, slope instabilities along a small portion of the route, and the serious potential impacts to cultural resources.

The worst route from an environmental perspective would be the East Las Vegas Integrated Intrastate System with the Wasatch Variation. This route would require the most new compressor stations, has the most difficult terrain from a geological perspective, would have significant impacts to surface water and freshwater biology, and would impact larger areas of big game habitat. In addition to these problems, the route would have to cross an Instant Study area northeast of Las Vegas. This land use conflict may not be resolved in the near future and the route may not be built until it is resolved.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Information provided by the applicants and further developed from field investigations, literature research, special studies, and contacts with local, state and federal agencies indicate that construction and operation of any of the proposed interstate natural gas pipeline projects would have limited, although in some cases significant, adverse environmental impact and that the proposed projects as stated in Section 1 of Volume III are environmentally acceptable, assuming the FERC finds sufficient need for such a project.

Several total system alternatives were investigated. The Mojave System utilizing the El Paso 600 MMcfd and Northwest 100 MMcfd expansions (System C) would entail 591 miles of pipeline construction. The main advantage of this system is that only 230 miles of pipeline would need to be constructed totally outside of existing ROW. Since the El Paso and Northwest expansions would involve looping of existing lines, the impacts to these areas would not be as great as would occur if these expansions involved totally new lines.

The main disadvantages to construction of the looping projects involve impacts to the environment with regard to vegetation, wildlife, and cultural resources. These impacts, although they occurred during previous construction, would be increased for the expansions. Most of these impacts could be significantly reduced if the mitigation measures discussed in Section 4 were employed; however, certain impacts would be unavoidable.

Significant impacts caused by the construction of the proposed Mojave System across California would include effects on soils, native vegetation, wildlife, land use, and cultural resources.

The El Dorado system would utilize the same additional facilities as were discussed for Mojave. Essentially, the El Dorado route would cause the same types of impacts as were discussed for Mojave. The El Dorado route, however, would have more slope stability problems and would cause potentially more impacts to cultural resources. El Dorado would have fewer long-term impacts on air quality and noise since one less compressor station would be required.

The Kern River system utilizing both the Wasatch and North Las Vegas Variations would be approximately 872 miles long. The main disadvantage of this system is that all of the route would entail new construction. Portions of the route would parallel existing ROWs and utility corridors; however, in no instances would the route use existing ROWs.

Other major disadvantages of the Kern River route include the construction of three new compressor stations causing impacts to both air quality and noise, slope stability problems and seismic hazards along the Wasatch Variation, impacts to soil, impacts to both surface water and freshwater biology, impacts to vegetation and agricultural land, impacts to paleontological resources, incompatibility with land use plans and recreation, and new impacts to visual resources.

The major advantage of the Kern River system route includes fewer impacts to threatened and/or endangered plant and wildlife species.

The environmental staff feels that on environmental grounds any of these systems could be made acceptable. However, economic and other non-environmental factors may play an important role in determining which of these projects would be best. Consideration of these factors is beyond the scope of this EIR/EIS; however they will be given full consideration in the later phases of the FERC certification process.

The environmentally preferred interstate proposals are the Mojave or El Dorado Systems with route modifications described in the EIR/EIS. This conclusion is based on two major premises: (1) these systems would involve significantly less environmental impact, even if built with all supply projects as proposed; and (2) the supply projects of El Paso and Transwestern could be phased to match actual market requirements as the EOR/cogeneration market evolves.

The first premise results from the fact that Kern River entails substantially more miles of pipeline construction and substantially more compression, crosses sensitive environmental areas, crosses one of these areas in which construction and maintenance will be difficult if not impossible without long-term environmental impact, and is not immediately adjacent to existing utilities to the extent the other systems are.

The Kern River route would cause greatest impacts to geology, including surface fault rupture, miles of landslide potential, and miles of slope greater than 30 percent; soils; surface water, including number of stream crossings, intermittent stream crossings, perennial stream crossings, and significant stream crossings; freshwater biology; vegetation, including total acres of native vegetation temporarily disturbed, acres of woody vegetation kept cleared for the life of the project, acres of riparian habitat disturbed, and acres of agricultural land temporarily disturbed; wildlife, including acres of big game critical or high priority habitat affected, acres of upland game bird sensitive habitat affected, acres of critical waterfowl nesting areas affected, and the number of raptor nesting areas affected; and paleontological resources. It would also involve at least one substantial land use obstacle.

In the case of the Mojave or El Dorado systems, no areas of significant construction or maintenance difficulty would be involved on the recommended routes, and major portions of the routes would be immediately adjacent to existing pipeline ROW. In addition, the supply lines would be entirely adjacent to existing pipelines and would share significant portions of previously disturbed ROW.

The Mojave system would have greater impacts to air quality and noise than the El Dorado system. It would also have marginally greater impacts to soils; surface water, including number of stream crossings; groundwater; vegetation, including acres of native vegetation temporarily disturbed, and acres of agricultural land temporarily disturbed; wildlife including acres of potential threatened or endangered animal habitat affected (Yuma clapper rail, bald eagle, peregrine falcon, Tehachapi slender salamander, desert tortoise, blunt-nosed leopard lizard, San Joaquin kit fox, Mojave ground squirrel, Nelson's antelope squirrel, and giant kangaroo rat); recreation conflicts; land use conflicts; and paleontological resources.

The El Dorado system would have greater impacts due to miles of slope greater than 30 percent, acres of riparian habitat crossed, impacts to California condor, Tipton kangaroo rat,and short-nosed kangaroo rat, cultural resources, and visual resources than would the Mojave system.

When compared to Kern River, the Mojave and El Dorado systems would have greater impacts to acres of California state listed plant species and habitat affected; acres of big game migration corridors affected, and acres of potential threatened or endangered animal habitat affected, (the Yuma clapper rail, peregrine falcon, blunt-nosed leopard lizard, Tehachapi slender salamander, San Joaquin kit fox, black-footed ferret, Nelson's antelope squirrel, short-nosed kangaroo rat, and giant kangaroo rat).

Premise number two is simply a reflection of the fact that existing systems may be expanded incrementally as the EOR/cogen market develops. Kern River must impact the environment along the entire proposed ROW regardless of the amount of gas initially or ultimately needed for that market. The environment along the El Paso and Transwestern systems involved in the proposed expansion can be impacted incrementally if the market does not materialize instantly at the level specified in the applications. Indeed, if it never attains that level, the environmental impact may be contained at a lower level.

As presented in the analyses of the intrastate systems in Section 2, the Northwest/PGT/Integrated Intrastate System Alternative would cause no environmental impacts. Based on purely environmental grounds this intrastate system alternative would be far superior to any of the interstate systems discussed above. However, it is not known at this point if the intrastate system

alternative could meet one of the main goals of the project i.e., supplying a firm supply of gas to the EOR market. Again this is beyond the scope of the EIR/EIS but will be given full consideration in the later phases of the FERC certification process.

If the certification process determines that the intrastate system does meet the stated goals of the project, the Northwest/PGT/Integrated Intrastate System Alternative would be the environmentally preferred system.

To adequately protect the environment, all of the mitigation measures outlined in Section 4 of both Volumes I and II shall be recommended for incorporation into the FERC certificate. These measures have been divided into two categories: general measures which would be applicable to all of the projects, and measures designed to address the specific problems associated with individual systems. In several instances the staff recommended measures have already been proposed by certain applicants. Additional measures which FERC and SLC staffs seek specific comment before adopting the measure as a staff recommendation are also included at the end of this section.

3.1 GENERAL STAFF RECOMMENDED MITIGATION MEASURES

Air Quality

General Impact: High dust levels would be present during construction.

1. The ROW shall be watered to keep dust down to a manageable level.

General Impact: Construction vehicle emissions would exceed stationary source levels.

2. Construction emissions shall be mitigated through proper maintenance of construction equipment, and by maintaining manufacturer-installed exhaust systems for construction emissions.

General Impact: High vehicle emissions would be present during construction.

3. The predicted exceedances could be mitigated if public access is restricted to outside of a few hundred foot wide buffer zone. This would only be necessary in populated areas in California. This type of measure could be imposed by the State of California during the final permitting process.

4. Additionally, impacts shall be reduced by optimizing air-to-fuel ratios and retarded ignition timing. This could reduce NO_x emissions by up to 30 percent.

Geology

General Impact: Geologic and seismologic hazards may result in erosion and/or landslides and subsequent damage to the pipeline and related facilities.

5. Detailed geologic, seismologic, and geotechnical studies shall be conducted by the applicant to identify and characterize geologic hazards as appropriate. In areas where hazards are identified, information shall be collected to aid in the design and construction of the pipeline and ancillary facilities. Emphasis shall be placed on arroyo crossings to protect the pipeline from flash floods and to prevent erosion of the trench backfill material near arroyos. In general, care shall be taken during construction to minimize surface disturbance and related soil erosion, and not to alter the drainage of the affected area.

6. Additional studies shall be conducted by the applicant to evaluate potential seismological hazards along the proposed routes. The potential for surface offset along Quaternary faults shall be evaluated in detail so that appropriate pipeline crossings can be designed. Field studies shall be completed to delineate the areas where movements may occur.

General Impact: Hydrocompaction and subsidence may occur along portions of the route.

7. The construction of the proposed projects would probably not introduce water that might cause hydrocompaction; however, care shall be taken during construction so as not to disturb the drainage of the affected area and to avoid producing any depressions in which water could pond.

General Impact: Unstable slopes may result in landslides which could result in a pipeline rupture.

8. Field studies shall be completed to locate and characterize potentially unstable slopes and other surficial features including sand dunes. Monitoring and surveillance programs shall be implemented, if necessary.

General Impact: Pipeline construction in geologically hazardous areas can significantly affect public safety.

9. The FERC staff recommends submittal of results of the proposed applicants' geotechnical studies indicated above, and submittal for review and approval of the following geotechnical studies and mitigating design measures prior to implementation of these measures. Such studies shall include identification of: (a) all Holocene faults crossed by the proposed facilities; (b) all areas where potentially liquefiable deposits are crossed and likely effects on the facilities; and (c) all landslides or areas of significant slope instability crossed by, or possibly affecting, the proposed facilities.

   Specific mitigating measures shall be developed to minimize the potential for slope failures, ruptures or failure of pipeline facilities wherever such failure could result in direct or indirect hazards to public safety and environmental resources. The nature and locations of significant geologic hazards shall be considered in the siting of block valves. The applicant shall also consider use of automatic or remote-controlled block valves in areas which may be inaccessible following a major earthquake or landslide.

   Studies shall be done in sufficient detail to allow characterization of the particular geologic hazard using state-of-the-art techniques. Sufficient justification should be included for not implementing specific mitigating measures in areas identified as subject to significant geologic hazards.

10. The topography of the corridor shall be restored to near its original contour.

11. Special methods including the use of padded ditch and heavy wall pipe shall be considered at fault crossings on a site-specific basis.

Soil

General Impact: Loss of topsoil.

12. Selective salvage and replacement of topsoil (A horizon) shall be done for agricultural lands and those lands for which the landowner requests that topsoil be salvaged and replaced or on lands underlain by poorly suited or unsuitable reclamation potential.

13. Trench backfill shall be replaced in a sequence and density similar to pre-construction soil condition.

14. Materials unsuitable for backfilling or excess backfill material shall be disposed of as arranged by the land management agency or landowner.

General Impact: Removal of vegetative cover or desert pavement resulting in increased erosion.

15. Preparation of surface shall be done to receive seed, including surface roughening and tilling across slopes, and seeding with adapted grass or other plant species.

16. To limit steepness or length of slopes, erosion control features, such as water bars, collection ditches, terraces, rock mulch (riprap), sand bars, or straw bales shall be used for temporary and permanent control.

17. Mulching with hay or straw, or restoration of desert pavement conditions shall be done. Crimping of hay or straw mulch into the soil on the contour or tacking netting over an organic mulch shall also be done.

18. The applicant shall minimize the amount of vegetation removed, and where it is removed leave the roots intact.

19. The applicant shall minimize time interval between clearing, construction, and reseeding.

20. During construction of the project, an on-site reclamation specialist shall be employed by the company to provide direct applicable restoration procedures when special conditions are encountered, without causing construction delays.

General Impact: Reduction in soil productivity.

21. The applicant shall add soil amendments, including fertilizer, and use appropriate seeding methods to aid in the development of a positive growth medium.

General Impact: Accelerated soil erosion.

22. Where practical, the pipeline shall be located on side-slopes of less than 30 percent.

23. Fencing of ROW through rangeland shall be done to allow undisturbed re-establishment of vegetation. In the absence of recommendations on the location of crossovers from local land managers or permittees, crossovers shall be located every 500 yards.

24. The applicant shall minimize the areas of disturbance to a minimum necessary to construct and operate the pipeline. Steep slopes and particularly sensitive areas prone to significant impact shall be avoided.

25. Suitable mulches and other soil stabilizing practices shall be used on all regraded and topsoil areas to protect unvegetated soil from wind and water erosion and to improve water absorption.

26. Soil areas with rock fragments, such as very coarse gravel, cobble or stone scattered on the surface shall be restored to the original pre-construction surface condition to blend with the adjoining area, to avoid a smooth surface ROW area, and to control accelerated erosion.

General Impact: Ineffective stabilization and reclamation on federal lands.

27. On federal lands, a detailed site-specific geotechnical and restoration and reclamation plan shall be developed and become part of the Forest Service/Bureau of Land Management construction, operation, and maintenance (COM) plan. Because the proposed ROW is composed of many types of terrain, soils, water, bedrock, vegetation, land uses, and climatic conditions, the detailed plan shall include sets of techniques and measures tailored to each condition encountered. Local expertise and locally effective slope stabilization and reclamation methods shall be followed when the site-specific procedures for the detailed plans are developed. Site-specific geotechnical and erosion control, revegetation, and restoration measures from the plans shall be implemented under the direction of the appropriate agency official.

28. During construction of the project, an on-site reclamation specialist shall be employed by the company(s) to provide liaison with the FS/BLM officials.

29. All topsoil on federal lands shall be conserved for reclamation requirements unless otherwise directed by the FS/BLM; excess topsoil shall be stockpiled at designated locations. Topsoil shall be removed from the trench area by double-ditching (i.e., windrowed separately, protected, and replaced last during backfilling).

30. During adverse weather conditions, as determined by the FS/BLM authorized officer, stop and start orders on federal lands shall be issued to prevent rutting or excessive tracking of soils and deterioration of vegetation in the ROW area.

31. On federal lands, design and construction of all temporary, reconstructed, and newly constructed roads shall be based on an approved COM plan transportation section and shall ensure proper drainage, minimize soil erosion, and preserve topsoil. This plan shall include clearing work, rehabilitation, and use and maintenance agreements associated with transportation needs.

Where possible, the ROW itself shall be used as an access road during the construction period. The FS would require that the access roads paralleling this pipeline be closed and vegetative cover re-established after pipeline construction is completed. No maintenance roads along the pipeline route shall be permitted.

Overland access may be specified in lieu of road construction or reconstruction.

All temporary roads shall be closed and areas restored without undue delay or maintained as specified in the ROW grant(s) or special use permit(s). Restoration to near original slope and contour, including redistribution of topsoil, would be to the satisfaction of the FS.

32. On federal lands, a specific trenching and excavated material stockpiling procedure shall be used on steep-sloping and rough, broken terrain to ensure maximum disturbance as outlined in the FS/BLM COM plan.

33. On federal lands, temporary work space areas used at highway and stream crossings and other special sites shall be restored to approximate pre-construction conditions and to the satisfaction of the FS/BLM.

34. Chiseling shall be used, unless objected to by the FS/BLM, in federal range land areas to reduce compaction and improve soil permeability. Pitting and contour furrowing as directed by the FS/BLM shall be done on steeper slopes of disturbed areas to increase infiltration and to reduce runoff and erosion.

Surface Water

General Impact: Increased surface runoff, erosion, and off-site sedimentation associated with ROW clearing, construction, operation and abandonment of the ROW.

35. The applicant shall develop and implement site-specific erosion control, revegetation, and stabilization plans as soon as possible to limit soil erosion and potential sediment input.

36. The applicant shall minimize stream bank and streambed disturbance to the extent practicable.

37. Construction across intermittent streams shall be done during periods of low or no flow.

38. After pipeline construction is completed, construction contractors shall stabilize disturbed areas promptly.

General Impact: The proposed measures for controlling or reducing impacts caused by the withdrawal and discharge of water used in hydrostatic testing would not ensure that the impacts would be reduced to acceptable, non-significant levels.

39. Hydrostatic test water shall be tested and treated, if necessary, before release.

40. Hydrostatic test water shall be released in a controlled manner to reduce the potential for scour if discharged into natural waterways.

41. Water used in hydrostatic testing of the pipeline shall be discharged into an appropriately designed retention pond prior to discharge into the environment in accordance with local, state and federal (NPDES) permits. Retention ponds shall be filled in and returned to pre-construction conditions after use.

42. No stream with inadequate flow rate shall be used as a water source for hydrostatic testing, and adequate flow should be maintained for instream uses and downstream withdrawals.

43. Water for hydrostatic testing shall be reused wherever possible.

General Impact: Reduced water quality, increased sediment loading, and aggradation and degradation of stream channels due to channel bed disruption in response to constructing pipelines through channels.

44. The pipeline shall be buried at stream crossings below the estimated scour depths associated with a 100-year flood event. At crossings where channel degradation has reduced the burial depth to less than the 100-year scour depth, reburial of the pipeline to the proper depth shall be required.

45. Pipeline operators shall check the pipeline burial depth periodically at stream/channel crossings.

46. Coffer dams shall be used for all perennial stream crossings with moderate to high sensitivities due to channel

gradient. They shall also be used to permit flow in one part of a stream while pipelaying construction occurs in another part.

Stream crossings shall be made as perpendicular to the axis of the channel as possible.

47. Spoil from trench excavation shall be placed out of the stream on the banks at narrow stream crossings. Spoil shall be carefully placed downstream of the trench at wide crossings.

48. Backfilling shall be performed slowly to minimize agitation and increased sediment loading.

Good quality backfill shall be placed in streams.

General Impact: Reduction in water quality due to fuel or chemical spillage, and impacts to surface water and groundwater resources during the construction and operation of the pipeline.

49. Chemicals, fuel, and lubricating oils shall not be stored near stream channels. Spill containments shall be installed or constructed around all chemical, fuel, and oil storage areas. Refueling and changing lubricating oil shall not be done in or near stream channels, or where an accidental spill could run into a stream channel or shallow ground water zone. Any accidental spills shall be promptly cleaned up.

General Impact: Not all increased surface runoff, erosion, and off-site sedimentation would be reduced to acceptable, non-significant levels. Additional mitigation beyond the proposed would be required to further reduce these impacts.

50. Intensive surface runoff and erosion control shall be required beyond those proposed on steep slopes that would drain directly into streams. The applicant shall make judicious use of sediment filters, closely spaced water bars, and erosion netting.

51. The applicant shall minimize ROW width to that absolutely necessary.

52. The applicant shall minimize the time interval between site clearing and site stabilization.

Groundwater

General Impact: Potential channeling of groundwater along the pipeline.

53. Bulkheads shall be installed on slopes to minimize potential channeling.

General Impact: Effects on springs.

54. The applicant shall identify all nearby springs which serve as sources of water supply or are important to wildlife, evaluate potential effects of construction, and take appropriate precautions to minimize any adverse effects.

Freshwater Biology

General Impact: Increased turbidity and sedimentation of aquatic habitats.

55. The applicant shall work backhoes or draglines from the stream banks, where possible, to trench any submerged stream crossings.

56. During construction on federal lands near streams or lakes, sedimentation basins and/or straw bale filters shall be constructed, as required by the FS/BLM.

General Impact: Disturbed stream banks would result in bank cutting and erosion.

57. Disturbed stream banks shall be restored by replacing topsoil and replanting native riparian species.

Terrestrial Biology

Vegetation

General Impact: Loss or disturbance of vegetation along the construction ROW.

58. The applicant shall design and implement site-specific revegetation plans according to the requirements and guidelines of the land management agency (BLM or FS) or landowner. These plans are assumed to include the necessary topsoil replacement, seedbed preparation, mulching, fertilization, use of seed mixtures containing native species, noxious weed control and additional erosion control. Generally the revegetation objective would be to

return the disturbed area to a condition that would perpetuate previous land use. Guidelines established by the SCS shall be used where the pipeline would traverse private land, and if it is agreeable to the owner. Periodic inspection of the ROW shall be conducted by the applicant and reclamation efforts enhanced where needed.

59. During construction the applicant shall clear the minimum ROW width possible and minimize ROW damage where possible (e.g. not stripping vegetation less than four inches in height, leaving trees standing and/or mowing taller vegetation as opposed to clearing, the last being particularly desirable in Mojavean shrub communities). This shall include local adjustment of pipeline alignment to avoid areas with high densities of sensitive plant species or sensitive communities (Class II impacts).

60. Existing ground cover such as grasses, leaves, brush, and tree trimmings shall be cleared and piled only to the extent necessary. Slash and limbs shall be piled and later shredded and chipped for use in restoration operations or disposed of as directed by the appropriate agency or landowner.

61. Trees and shrubs on the ROW that are not cleared shall be protected from damage during construction.

62. Trench backfilling operations shall be conducted in such a manner to minimize further disturbance of vegetation.

The following seven measures shall apply only on federal lands:

63. Joint inspection of the ROW by the company(s) and the FS/BLM shall be conducted on federal lands to monitor the success and maintenance of erosion control measures and revegetation programs on native grazing lands for two growing seasons, or for a period determined by the FS/BLM. The monitoring program would identify problem areas and corrective measures to ensure vegetation cover and erosion control. Certification of successful revegetation and erosion control would be determined by the FS/BLM.

64. On federal lands, seed shall be planted by drilling, broadcasting, or hydroseeding. Drilling is the preferred method, because it is usually most successful.

- Drill seeding with a grass drill equipped with depth bands shall be used where topography and soil conditions allow operations of equipment to meet the seeding requirements of the species being planted.

- Broadcast seeding shall be used for inaccessible or small areas. Seed shall be covered by raking or harrowing.

- Hydroseeding would be done in critical areas determined by the FS/BLM.

65. Only species adapted to local soil and climatic conditions shall be used on federal lands. Generally, these would be native species. However, introduced species may be considered for specific conditions when approved by the FS/BLM. Seeding rates in critical area plantings and generally throughout the ROW would be increased 100 percent over regular seeding rates to allow for seed mortality due to adverse growing conditions.

66. Seed testing will be conducted on federal lands to meet state, federal, and agency seed requirements.

67. On federal lands, seeding shall be done when seasonal or weather conditions are most favorable and as determined by the FS/BLM.

68. Grazing on federal lands shall be delayed for a period directed by the FS/BLM to provide for vegetation to become established, especially in highly erodible areas. Procedures for excluding grazing within the ROW could involve protective fencing; removal of range animals from affected allotments, with compensation by the company(s) to range permittees; adjustable grazing use schedules within allotments; etc. In the case of protective fencing, fences shall be constructed, maintained and removed by the company(s) according to FS/BLM specifications.

69. On federal land, the applicant shall preclear mountain brush and tree-covered areas prior to dozer or maintenance blade work. Preclearing would involve handwork or specialized equipment, i.e. mechanized shears, etc., in cutting of brush or trees with removal by proper equipment to designated areas.

General Impact: Loss of sensitive plant species individuals or habitat.

70. The applicant shall avoid locations of sensitive species and environmentally sensitive areas which include sensitive communities and known and suspected habitat of plant species of special concern. Specific information on sensitive areas shall be obtained by conducting field surveys along portions of the proposed route for individuals and habitat of species of concern and sensitive communities. Field surveys shall be conducted during the appropriate time of year by a qualified botanist. Where

feasible, pipeline alignment shall be adjusted to miss or minimize impacts (Class II) to identified individuals or habitats.

71. The applicant shall restrict access onto pipeline ROW where possible, by constructing barricades, fences with locked gates or by posting with signs. This would be especially important for areas supporting sensitive communities or species of special concern.

General Impact: The loss of plant species of special concern or species contained in sensitive communities due to pipeline construction when it is not feasible to avoid such areas containing these species.

72. The applicant shall implement all mitigation measures formulated during formal consultation between the FERC staff and the FWS pursuant to the Endangered Species Act.

73. When it is not feasible to avoid areas containing plant species of special concern, the applicant shall attempt to transplant perennial plant species back into the ROW after construction.

Wildlife

General Impact: Disturbance to high interest species, such as game animals and raptors during periods of high stress (i.e. times of migration, and breeding and/or rearing).

74. The applicant shall conduct a preliminary survey to identify any raptor nests within the area of concern. All raptor nests found within the ROW shall be avoided. Construction activities shall be scheduled so that they do not conflict with raptors nesting within 0.5 mile of the proposed alignment. The appropriate state or federal agency has guidelines defining calendar dates when activity should not occur for these species.

75. The applicant shall prohibit vehicle operation off the ROW by construction workers, including construction work and employee access, except where specified by the landowner or land management agency or where roads already exist.

76. Project related powerlines shall be designed to protect birds from electrocution and collision.

General Impact: Disturbance or loss of habitat necessary to sustain high interest wildlife species. This includes but is not limited to habitat utilized as courtship, nesting/rearing areas,

and special habitat features such as water guzzlers, water tanks and springs.

77. The applicant shall revegetate all disturbed wildlife habitat deemed important to high interest species to predisturbance levels, following guidelines formulated by the appropriate governmental agencies.

78. In sensitive or important wildlife habitats, the applicant shall clear the minimum ROW width possible and minimize ROW damage.

General Impact: Loss of individuals of any species of special concern (federal and/or state listed or candidate species, BLM sensitive species). Disturbance that results in a reduction in recruitment to their populations.

79. The applicant shall implement all wildlife mitigation measures formulated during formal consultation between the FERC staff and the FWS pursuant to the Endangered Species Act.

80. The applicant shall conduct detailed surveys prior to construction in order to identify precise locations of viable populations. Surveys shall be conducted at the appropriate season and time to ensure that targeted species can be enumerated.

81. Construction activities for threatened or endangered species shall be timed so as not to conflict with crucial time periods such as hibernation. This would apply to the blunt-nosed leopard lizard but not to the desert tortoise where construction during hibernation is desired.

82. In areas potentially occupied by desert tortoise, the following mitigation methodology developed by Reyes-French [1985] shall be adopted. Conduct a pre-construction survey to delineate areas of desert tortoise concentrations. Limit construction activities in these areas to the hibernation period between October 30 and March 1 in Arizona. Employ qualified tortoise biologists to conduct tortoise searches within the impacted area immediately before construction so that hibernating individuals may be removed from the path of construction. Have a desert tortoise expert on the site during the construction phase. Remove any active tortoises ahead of the construction equipment. Hibernating tortoises removed from the construction area shall be kept over the winter at an appropriate facility under specified artificial environmental conditions. These individuals shall be released the following spring in the immediate vicinity of their capture. Injured or dead tortoises shall be handled and/or disposed of according to Memorandum of Understanding with

the California Department of Fish and Game or other appropriate agencies. These measures would not be required of Northwest since no desert tortoise habitat would be present.

83. Limit the length and duration of open trenches. Open trenches shall be limited in length to 0.25 mile and duration of open segments shall not exceed three days. Before backfilling, the trench shall be inspected for trapped animals. All such animals shall then be released in the same general locality, but beyond the area of disturbance.

84. Trenches shall be inspected daily for species of special concern that might have fallen into the trenches. Any species of special concern found should be handled in accordance with prearranged agreement with the appropriate agencies.

85. Access to the ROW shall be restricted wherever feasible by constructing barricades, fences with locked gates at road intersections, and by posting signs.

86. The applicant shall limit the speed of vehicles along the ROW and access roads to 15 mph in sensitive habitats that support species of special concern with limited home ranges and mobility, e.g., the blunt-nosed leopard lizard and the desert tortoise.

General Impact: Loss or disturbance of habitat utilized by species of special concern. This includes any designated critical habitat of proposed or listed threatened or endangered species, or loss or disturbance of greater than one percent of habitat supporting a viable population of species of special concern.

87. The applicant shall conduct field surveys to identify environmentally sensitive areas, such as nest sites, winter roosts, or habitat that supports viable populations of species of special concern. The applicant shall avoid these areas where possible.

88. All disturbed designated critical habitat and habitat suitable for species of special concern shall be revegetated to predisturbance levels following guidelines formulated by the appropriate governmental agencies.

Grazing

General Impact: Loss of 5 percent or more of carrying capacity on an allotment traversed by the proposed pipeline alignment.

89. The applicant shall clear only the minimum ROW width and take steps to minimize ROW damage.

90. The ROW shall be revegetated so that pre-project grazing opportunity levels are re-established.

General Impact: Broken fences and disruption of natural and artificial barriers to livestock needed to maintain separation and control of livestock.

91. The applicant shall repair fences and maintain livestock separation and control devices such as cattleguards, gates, drift fences and natural barriers to equal the effectiveness of the existing control structures prior to pipeline construction or operation.

92. The applicant shall maintain livestock separation and control during construction activities as well as post-project periods.

93. The applicant shall replace any water lines or drinkers damaged as a result of pipeline construction.

Socioeconomics

General Impact: The presence of construction workers may impact tourism and the availability of temporary housing.

94. Construction of the pipeline shall be scheduled to avoid peak tourist seasons in the affected area if possible. Other construction timing stipulations shall avoid peak tourist seasons.

95. In rural areas, workers need to seek housing and services in larger, more distant communities. Project employees may be able to travel to and from construction areas together. Implementation of this measure would concentrate project-related housing demands in developed areas where accommodations are available, thus alleviating pressures on small communities and reducing individual commuting time.

96. To further mitigate housing impacts in rural areas or in crowded tourist areas, workers may be able to reside in temporary trailer camps. Implementation of this measure would permit small communities with limited services to

benefit from employee expenditures for food and supplies while residing in their own temporary accommodations.

97. The applicant shall comply with all applicable federal and state laws and regulations concerning the use of pesticides (i.e., insecticides, herbicides, fungicides, rodenticides, and other similar substances) in all activities and operations. The applicant would obtain approval from the applicable agency prior to the use of such substances. The plan would provide the type and quantity of the material to be used; the pest, insect, fungus, etc., to be controlled; the methods of application; the location of storage and disposal of containers; and other information that the agency may require. The plan would be submitted no later than December 1 of any calendar year that covers the proposed activities for the next fiscal year (i.e., December 1, 1986, deadline for a fiscal year 1988 action). If the need for emergency use of pesticides is identified, the use must be approved. The use of substances on or near the ROW and temporary permit areas shall be in accordance with the approved plan. A pesticide would not be used if the Secretaries of the Interior and Agriculture have prohibited its use. A pesticide would be used only in accordance with its registered uses and with the Secretarial limitations. Pesticides shall not be permanently stored on federal lands.

98. All structures such as terraces, levees, underground drainage systems, irrigation pipelines, and canals shall be restored to preconstruction conditions so that they would function as originally intended.

99. Gates on established roads on National Forest System lands shall not be locked or closed by the applicant.

100. Permittees and other regular users of National Forests affected by construction of the project(s) shall be notified in advance of any construction activity that might affect their businesses or operations. This would include but not be limited to temporary road closures, removal and/or cutting of fences, disturbances to range improvements or other range use-related structures.

101. Garbage, toxic substances and other refuse shall be disposed of in an authorized disposal site or landfill.

Cultural Resources

Archaeology

General Impact: Disturbance to cultural resources could occur along the proposed routes.

102. Based on the Cultural Resource Technical Report, the regulations at 36 CFR Parts 61.2, and the new ACHP regulations at 800.4 (a) (ii) and 800.4 (b) published in the Federal Register on September 2, 1986 (51 FR 31115), the applicant(s) receiving FERC certification shall contact the appropriate SHPO(s) for assistance in evaluating additional information resources which should be consulted and their recommendations for further surveys to enable the certificated applicant(s) to assess the eligibility of those properties currently identified in the Technical Report and identify any additional eligible or National Register properties. The certificated applicant(s) shall consult these resources and furnish the results of the assessment along with the SHPO's recommendations for field surveys to the FERC staff.

A cultural resource management plan shall then be designed by the applicant in consultation with the FERC, the SHPO(s), and other appropriate agencies including, on federal lands, BLM, the Forest Service, Bureau of Indian Affairs, and the Fish and Wildlife Service, as necessary. The management plan would outline procedures and methods to identify, evaluate, and protect (i.e., through avoidance or scientific data recovery) National Register and eligible properties. Appropriate research questions shall be included in the plan, although others may develop as the field investigation studies proceed. Guidelines for mitigation of impacts to resources that are not avoidable shall be included in the cultural resource management plan.

Consideration shall be given to a monitoring program for ground-disturbing activities in areas where cultural resource inventory indicates a likelihood that resources not now evident on the ground surface are likely to occur as buried resources. Such an "emergency discovery" program shall be consistent with the ACHP regulations at 36 CFR Parts 800.5 and 800.11 (a).

Prior to project construction, but after the formulation of the management plan, the applicant shall design and conduct an intensive cultural resource survey, where necessary, that is equivalent to a BLM Class III pedestrian survey of any previously uninventoried lands crossed by the final pipeline route and ancillary facilities. This survey shall be done in consultation with appropriate Native American groups to help identify resources of traditional Native American value.

Upon completion of the field surveys, the applicant shall identify for the FERC and appropriate SHPO(s) all cultural properties potentially affected by the undertaking, and how each property addresses either the research questions in the management plan, or other National Register criteria of

eligibility, and the applicant's opinion of the effect of the project on any properties. Once properties are properly identified and recorded, the FERC staff, in consultation with the SHPO(s), shall identify National Register properties by applying the National Register criteria of eligibility in light of the research questions developed for the management plan, new research questions inherent in the data, or other criteria under 36 CFR 60.4. Additional information concerning the resources shall be obtained by the applicant if required by the FERC staff to apply those criteria.

Cultural resources determined eligible for inclusion in the National Register shall then be evaluated as to the impacts of the project. A determination of effect shall be made by the FERC staff in consultation with the appropriate SHPO(s) pursuant to 36 CFR Part 800.5. Indicators for determining the potential effect of construction on cultural resources are set forth in the ACHP regulations at 36 CFR Part 800.9.

If it is determined that effects upon National Register or eligible properties would occur as a result of the project, a mitigation plan to reduce or eliminate these effects shall then be formulated. Site-specific mitigation plans shall be formulated in accordance with the appropriate provisions of the management plan. Any modification of the management plan deemed necessary in light of discoveries made during the field surveys shall also be identified. The mitigation plans shall discuss the timetables for completion of the final report for the phases of mitigation associated with data recovery, laboratory analyses and artifact curation. The final report shall document the method, theory, and results of implementing the mitigation plans. The final report shall be submitted to the FERC and the appropriate SHPO(s) upon completion in accordance with the identified timetables.

If properties on or eligible for the National Register would be affected, the FERC shall afford the ACHP an opportunity to comment on the effects of the project and the proposed mitigation plans.

Until the FERC staff has informed the applicant(s) in writing that the ACHP has provided the FERC with its comments pursuant to Section 106 of the National Historic Preservation Act and the applicant(s) has agreed to any modifications of the mitigation plan which the ACHP and the FERC staff have agreed upon, the applicant(s) may not proceed with implementation of the mitigation plans or with construction.

American Indian Concerns

103. Tribal plans for cultural resource preservation shall be followed on tribal lands. In general, sacred and archaeological sites shall be avoided whenever possible, burials shall be left undisturbed, and care be taken to avoid the destruction of traditionally used plants and animals. Artifacts recovered from archaeological excavation shall be returned to the tribe if found on tribal lands.

Paleontological Resources

General Impact: Loss or disturbance of paleontological resources could occur along the pipeline route.

104. The applicant shall implement the following measures to avoid or mitigate potentially adverse effects to paleontological resources resulting from construction of the proposed project that shall be implemented by the applicant. Implementation of this program should reduce damage to, or destruction of, significant fossils as a result of bedrock disturbances during construction operations. This program shall include pre-construction measures and monitoring of sensitive areas during construction operations.

Pre-Construction. Those areas identified as being of high paleontological sensitivity shall be examined prior to construction to determine the precise nature and location of fossils previously discovered within one mile of the pipeline route. Attention shall be directed toward identifying sections of these corridors where construction would result in bedrock disturbance adjacent to localities known to yield significant fossils. An initial pre-construction evaluation shall be made by comprehensively reviewing pertinent published paleontological literature, museum fossil locality records, and by requesting additional locality data from paleontologists who are engaged in active research in these areas.

A pre-construction surficial field inventory may then be recommended for those parts of the 100-foot wide pipeline construction corridor where disturbance of fossils may occur. The purpose of this inventory would be to evaluate in more detail the significance of local fossils by identifying the fossil types present, ascertaining their quality of preservation, and determining more precisely their extent and distribution. At some localities, small shallow trenches may be excavated to facilitate these observations.

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If it is found that significant fossils could be adversely affected, appropriate site-specific mitigation measures shall be designed. These measures may include the controlled scientific removal of fossils that would otherwise be damaged or destroyed during construction. Any such removals shall be made by professional paleontologists authorized by the appropriate federal, state, and county collecting permits. In accordance with these permits, all fossils shall be placed in appropriate repositories, with records of their precise locality, and descriptions of the geological and faunal context of each. This survey shall also determine whether additional mitigation measures should be implemented during construction activities.

Construction. Mitigation measures that may be implemented during construction shall include monitoring construction activities in which bedrock would be disturbed. This may entail inspection of cleared and graded sections of the corridor before trenching, and inspection of the rock excavated from the trench before burial of the pipe.

Procedures shall be established and approved by permitting agencies for temporarily halting or redirecting construction if fossil accumulations are encountered during construction. An approved paleontologist, contracted to implement the management plan, shall be notified immediately upon encountering a chance fossil find so that the significance of the find can be evaluated efficiently and, if necessary, mitigation actions taken.

If significant fossils are encountered during construction, their controlled scientific removal from the construction site may be necessary. Removal of fossils discovered during construction shall be implemented by professional paleontologists in accordance with professionally recognized standards.

Land Use

General Impact: Conflict with land use.

105. Technical assistance and approval of written plans for National Forest System lands shall be obtained from the Forest Service prior to any construction.

106. All existing improvements under federal management or permit shall be protected and damage repaired immediately.

107. Forest Service approval shall be required for locating sites for equipment storage, pipe storage, and staging areas on National Forest System lands. a site preparation

plan would be required for these sites, as part of the COM plan.

108. A fire control plan shall be prepared as part of the COM plan for the Forest Service.

Visual Resources

General Impact: Degradation of visual resources could occur along the pipeline route.

109. The applicant shall implement three generic types of mitigation techniques: 1) strategic location, 2) minimization of disturbance, and 3) repetition of basic landscape elements (form, line, color, texture). Mitigation recommendations described below, based on these techniques, will reduce visual contrasts of the project facilities.

Construction. During construction, clearing of land for facilities or structures should create curvilinear boundaries instead of straight lines and minimize marring and scarring of the landscape to the greatest practical extent. Grading shall be done in a manner which will minimize erosion and conform to the natural topography [USFS, 1977].

Cleared brush or small trees not otherwise disposed of shall be piled in a way that provides cover habitat for small mammals, reptiles, and birds. Such brush piles shall be screened from public view to the greatest practical extent [Robinette, 1973].

Soil and rocks that are excavated during construction and not used shall be evenly backfilled into the cleared area or removed from the site. Soil and rocks shall be graded to conform with the terrain and the adjacent land.

Compressor Stations: The colors selected for the compressor stations, and other structures and facilities shall be based on the following considerations [Robinette, 1973]:

- The colors shall be uniform and noncontrasting to blend with the immediate natural environment. The warmest color tones are appropriate for natural settings.
- Exposed concrete shall be tinted to match the soil color.
- Colors shall be selected on the basis of their ability to blend with both the sky and the environment in which they are being used.

- Colors that reflect adjacent colors by including them are most successful in adapting to their environment and shall be utilized.
- Colors approved in the Munsell Soil Color Coding System and displayed on the Standard Environmental Color Chart shall be considered.

Overhead Electrical Powerline to Compressor Stations:

- Towers or poles shall be placed strategically to make maximum use of existing topography and vegetation for screening.
- Electrical powerlines shall be located at the base of slopes when feasible to provide a background of topography and/or natural cover.
- Materials used to construct towers or poles shall harmonize with the natural surroundings. Where natural wood poles are appropriate, the color range should be limited to present unified series of poles.
- Choice of conductor material shall be carefully considered to avoid sheen or a strong silhouette and to provide blending of the conductors into any given setting through which the line must pass.
- When lines are adjacent to roads, guyed towers shall be avoided whenever possible.

Landscape-type Measure

Grading and earthwork:

- Minimize routing pipeline along prominent ridgelines.

Riparian (streams, rivers, and washes). When providing access to the pipeline ROW, rivers, streams and washes shall be crossed at existing roads or bridges when present; any other crossing must be approved and designated by the land managing agency. All stream channels and washes shall be returned to their pre-construction state. Such construction, when it would occur will be managed under the restrictions in the current BLM manual and/or Department of Interior policy direction. Mitigation measures required should include:

- Installation of culverts or bridges at points where new permanent access roads would cross live streams to allow unobstructed fish passage.

- Where drainages would be crossed by temporary roads, dirt fills, or culverts shall be placed and removed upon completion of the project.
- Construction activity in a perennial stream shall be prohibited so long as other alternatives exist unless specifically allowed by the BLM and/or the FS.

Forested Areas. Several different types of forest ecosystems are encountered at the higher elevations along the various loops and although they have differing species, they can be treated uniformly and the mitigation measures are virtually identical.

- Leave trees as close to the downhill side of the ROW as possible,
- Create as few landings and turnouts as possible, and do not locate them on the noses of ridges or exposed slopes,
- Avoid grade changes as much as possible,

Distance Zone Measures

Foreground View. A foreground view is determined to be the detailed view from between 0 to 1/4-1/2 mile from the viewer. Visual impact appearing in a foreground view shall be obscured, concealed, or disguised through screening or controlling access to views.

Middleground and Background View. Views beyond 1/2 mile shall be mitigated by revegetation techniques to blend the impact back into the surrounding environment, utilizing landscape texture, color, and pattern to subordinate the impact and soften the edges.

Performance Measures

In order to meet BLM VRM and FS VQO goals, certain time limitations shall be established within which mitigation measures must occur to reduce visual impacts upon the existing environment.

110. On federal lands the applicant shall prepare a plan to minimize the visual impacts from structures. If required by the FS/BLM, the applicant would prepare photographic simulations of the areas in which facilities are proposed within foreground-middleground areas of high scenic value or sensitivity. Using the simulation as a guide, the applicant would design and locate the pipeline route and ancillary structures to blend into the existing environ-

ment. The FS/BLM would evaluate and approve measures before construction begins.

111. For the COM plan, the FS/BLM would identify segments of the pipeline ROW on federal lands where vegetative clearing widths would be modified, i.e., feathered or undulated. This would be done to maintain the visual quality objectives of the respective National Forest Land and Resource Management Plan.

3.1.1 Staff Recommended Mitigation Measures for the Mojave Proposal

Geology

General Impact: Volcanic activity may cause damage to the pipeline.

112. The volcanic cinder cones near Amboy and Hector shall be investigated to estimate the potential of an event that would affect the Mojave Mainline.

Terrestrial Biology

Vegetation:

113. Mojave shall notify the Arizona Commission of Agriculture and Horticulture at least 30 days prior to the start of construction, so that the agency can survey the proposed ROW in Arizona and salvage protected plants.

Wildlife:

114. Surveys shall be conducted by Mojave to determine the distribution of San Joaquin kit fox and blunt-nosed leopard lizard habitat in areas of the San Joaquin Valley that would be traversed by the proposed pipeline. Rerouting of the pipeline shall be evaluated and done where possible, and in areas where the habitat of the two species must be crossed, the width of the construction ROW would be restricted to 50 feet. Pipeline alignment shall be adjusted to avoid dens within the construction ROW. No construction shall be done in San Joaquin kit fox habitat during pupping season (March-May) and revegetation plans shall include measures to promote reestablishment of plant species that annually produce seeds, in order to favor populations of kangaroo rats, which are the kit fox staple food.

115. In San Joaquin kit fox habitat, establish temporary artificial barriers 35-50 feet from washes to minimize potential chemical contamination from surface runoff.

Land Use

116. Mojave shall realign its route to maximize use of existing corridors in the CDCA. The applicant shall use Alternative B and the proposed El Dorado route around Barstow. The route shall also be realigned to avoid Edwards Air Force Base by using Kern River's mainline route in this area.

117. Mojave shall realign its route between the town of Mojave and the floor of the San Joaquin Valley to avoid Tehachapi Mountain Park, the community of Stallion Springs, and the Chanac Creek drainage. This can be accomplished by using either of the proposed Kern River or El Dorado routes in this area.

118. Mojave shall cross the Kern River at the location identified for the North Bakersfield Variation to Kern River's proposed project to avoid major impact to Kern River County Park.

System Safety and Reliability

119. Aircraft monitoring of the pipeline ROW for operation and maintenance purposes shall be coordinated with nearby military installations, e.g., Edwards AFB, in order to avoid potential conflict.

120. The route through Bakersfield shall be carefully selected to avoid or minimize impact on areas zoned residential or recreational.

3.1.2 Staff Recommended Mitigation Measures for the El Dorado Proposal

Geology

General Impact: Volcanic activity may cause damage to the pipeline.

121. The volcanic cinder cones near Amboy and Hector shall be investigated to estimate the potential of an event that would affect both the El Dorado Mainline and Alternative A.

Terrestrial Biology

Vegetation:

122. El Dorado shall notify the Arizona Commission of Agriculture and Horticulture at least 30 days prior to the start of construction, so that the agency can survey the proposed ROW in Arizona and salvage protected plants.

Wildlife:

123. Surveys shall be conducted by El Dorado to determine the distribution of San Joaquin kit fox and blunt-nosed leopard lizard habitat in areas of the San Joaquin Valley that would be traversed by the proposed pipeline. Rerouting of the pipeline shall be evaluated and done where possible, and in areas where the habitat of the two species must be crossed, the width of the construction ROW shall be restricted to 50 feet. Pipeline alignment shall be adjusted to avoid dens within the construction ROW. No construction shall be done in San Joaquin kit fox habitat during pupping season (March-May) and revegetation plans shall include measures to promote re-establishment of plant species that annually produce seeds to favor populations of kangaroo rats, which are the kit fox staple food.

124. In San Joaquin kit fox habitat, establish temporary artificial barriers 35-50 feet from washes to minimize potential chemical contamination from surface runoff.

Land Use

125. El Dorado shall realign its route to avoid Edwards AFB by using Kern River's proposed route in the area.

System Safety and Reliability

126. Aircraft monitoring of the pipeline ROW for operation and maintenance purposes shall be coordinated with nearby military installations, e.g., Edwards AFB, in order to avoid potential conflict.

127. The route through Bakersfield shall be carefully selected to avoid or minimize impact on areas zoned residential or recreational.

3.1.3 Staff Recommended Mitigation Measures for the El Paso Proposal

Terrestrial Biology

Vegetation:

128. El Paso shall notify the Arizona Commission of Agriculture and Horticulture at least 30 days prior to construction, so that the agency can survey the proposed ROW in Arizona and salvage protected plants.

Land Use

129. The El Paso 100/500 or 200/400 alternatives would cross the Elden Environmental Study Area along the 4.1 miles of the Leupp loop west of the Flagstaff Compressor Station. This area shall be avoided by eliminating that section of the loop by appropriate engineering design, either by relocation or increased compression.

Cultural Resources

American Indian Concerns:

130. The Navajo Nation has well-developed policies with regard to archaeological and sacred sites and the disposition of burials. They require a complete inventory of archaeological and sacred sites along the proposed expansion loops. Such an inventory will require both a pedestrian survey of the construction corridor and facility areas as well as interviews with local residents (land-users) and medicine men to fully document the presence of sacred sites. Some of these sites are already on record in local BIA offices. Burials, if encountered, must be identified if possible, and avoided whenever feasible. Reburial is possible when certain conditions are met, however. Archaeological excavation requires a permit from the Navajo Nation. In addition, the various chapters of the Navajo Nation wish to have a voice regarding which side of the original pipeline the proposed expansion loops would be laid.

3.1.4 Staff Recommended Mitigation Measures for the Northwest Project

Terrestrial Biology

Wildlife:

131. Conduct surveys as required by the U.S. FWS to identify prairie dog colonies in the project area. Where active

colonies are found to be impacted by the proposed route, further surveys by a qualified biologist shall be completed to determine the presence or absence of black-footed ferrets. Such surveys shall be done within one year of initial pipeline construction.

3.1.5 Staff Recommended Mitigation Measures for the Transwestern Proposal

Soil

132. Transwestern shall implement erosion control measures in the Carlsbad Resource Area (BLM Roswell District) as required by the authorizing officer. One example of such a measure is the use of water bars with the following guidelines:

- Simulate the imaginary contour lines of the slope, ideally with a grade of 1 to 2 percent.
- Drain down and away from the disturbed area.
- Begin and end in vegetation.
- Use the following spacing intervals:

Slope (%)	Interval (feet)
less than 2.5	200
2.5 to 5	150
6 to 9	100
more than 9	50

133. In the Carlsbad Resource Area, Transwestern shall keep blading to an absolute minimum, with no blading of flat areas, where possible, and no blading of spoil areas. In areas where the spoil side has not been prebladed, keep the blade at least 2 inches above the ground.

The pipeline project shall be limited to a 50-foot ROW overlapping existing ROW's MN-070224 and MN-8722 with ditch lines not more than 20 feet off of existing ditch lines. If extra construction width is necessary, it will be held to a maximum of 20 feet confined to the southwest side of the ditch line between the compression station and the New Mexico Potash Company tailings and on the northeast side between New Mexico Potash and the tie-off point.

Terrestrial Biology

Vegetation:

134. Transwestern shall notify the Arizona Commission of Agriculture and Horticulture at least 30 days prior to construction, so that the agency can survey the proposed ROW in Arizona and salvage protected plants.

135. Throughout the Carlsbad Resource Area reseeding will be required on all portions of the ROW where blading occurs. Seeding will be done with a disk-type drill. The seeder will be followed by a drag, packer, or rollers to ensure adequate compaction. The seed mixture will consist of:

Species	Pounds per acre of pure live seed
Sand dropseed	0.25
Sand lovegrass (*Eragrostis trichoides*)	0.50
Little bluestem (*Andropogon scoparius*)	0.25

Wildlife:

136. Prior to construction on public lands in the Carlsbad Resource Area, a qualified biologist shall survey all potential raptor habitat within 0.25 mile of the pipeline and identify active and inactive nests. Construction within 0.25 mile of active aeries shall not be permitted during the nesting season (April 1 to October 1 for raptors). Construction is permitted near inactive nests; nests shall not be disturbed. Construction may occur between October 2 and March 28.

137. Prohibit vehicle operation off the ROW by construction workers, including construction work and employee access, except where specified by the landowner or land management agency.

Land Use

138. Transwestern Loop G would be on the border of the Fort Valley Experimental Forest in Coconino NF. The loop shall be located on the north side of the existing pipeline in the vicinity of the experimental forest.

139. The proposed pipeline shall be routed on the northeast side of the existing pipeline from the Transwestern Compressor Station to just before the New Mexico Potash Company, Inc.,

Mine tailings and on the southwest point. Routing around or through the potash tailings will be determined with appropriate special stipulations at a later date.

140. Prior to issuance of grant, the BLM will require confirmation that Transwestern has coordinated with the New Mexico Potash Company, Inc., to ensure that 1) subsidence from potash removal will not impact the proposed pipeline, and 2) that the most feasible route is developed either through or around the potash tailings and settling ponds. Any new routes will be evaluated, archaeologically cleared, etc., prior to authorization.

Cultural Resources

American Indian Concerns:

141. The Navajo Nation has well developed policies with regard to archaeological and sacred sites and the disposition of burials. They require a complete inventory of archaeological and sacred sites along the proposed expansion loops. Such an inventory will require both a pedestrian survey of the construction corridor and facility areas as well as interviews with local residents (land-users) and medicine men to fully document the presence of sacred sites. Some of these sites are already on record in local BIA offices. Burials, if encountered, must be identified if possible, and avoided whenever feasible. Reburial is possible when certain conditions are met, however. Archaeological excavation requires a permit from the Navajo Nation. In addition, the various chapters of the Navajo Nation wish to have a voice regarding which side of the original pipeline the proposed expansion loops would be laid.

Visual Resources

142. Paint all above-ground facilities a color that blends with the surrounding landscape. Within the BLM's Carlsbad Resource Area, paint all above-ground facilities sandstone brown and periodically maintain them in accordance with federal standard 595-20318 or 30318.

3.1.6 Staff Recommended Mitigation Measures for the Kern River Proposal

Geology

143. Avalanche hazards shall be mitigated by routing the pipeline down stable ridgelines to an elevation where the potential for avalanche damage is not significant.

144. Other mitigations for pipeline protection against avalanche hazards shall include encasing the pipe in a protective housing within the avalanche prone areas or deep burial of the pipe in the high mountain avalanche prone areas.

145. Kern River shall realign its route to use the Wasatch Variation. This would significantly reduce the potential of pipeline rupture and damage to the environment by eliminating segments of the mainline which contain severe slope stability problems.

Freshwater Biology

146. Impacts to fish species of special concern shall be sufficiently mitigated through scheduling construction activities so that they do not conflict with the particular species during spawning seasons. The appropriate state or federal management agency has guidelines defining calendar dates when activity should not occur for the species in question. Scheduling of construction may vary with the environment and climatological circumstances for any given year.

Terrestrial Biology

Wildlife:

147. Surveys shall be conducted by Kern River to determine the distribution of San Joaquin kit fox and blunt-nosed leopard lizard habitat in areas of the San Joaquin Valley that would be traversed by the proposed pipeline. Rerouting of the pipeline shall be evaluated and done where possible and in areas where the habitat of the two species must be crossed, the width of the construction ROW shall be restricted to 50 feet. Pipeline alignment shall be adjusted to avoid dens within the construction ROW. No construction shall be done in San Joaquin kit fox habitat during pupping season (March-May) and revegetation plans shall include measures to promote reestablishment of plant species that annually produce seeds to favor populations of kangaroo rats, which are the kit fox staple food.

148. In San Joaquin kit fox habitat, establish temporary artificial barriers 35-50 feet from washes to minimize potential chemical contamination from surface runoff.

149. Conduct surveys as required by the FWS to identify prairie dog colonies in the project area. Where active colonies are found to be impacted by the proposed route, further surveys by a qualified biologist shall be completed to determine the presence or absence of black-footed ferrets.

Such surveys shall be conducted within one year of initial pipeline construction.

Grazing:

150. Kern River shall apply the following measures in sequential order, to mitigate impacts to grazing:

- re-scheduling of pasture rotation so that affected pasture is allowed more time to revegetate
- not using an allotment and reallocate the affected AUMs to other unused or under-used allotments
- removal of livestock from affected allotments for three to five years with compensation to the permittee

If none of the mitigation measures are effective, feasible or available and revegetation of the ROW is of major importance to the managing agency, the ROW shall be fenced for at least three to five years. In some cases, a 50-foot crossover strip placed every two miles would be feasible.

Land Use

151. Kern River shall utilize the North Las Vegas Variation.

System Safety and Reliability

152. Aircraft monitoring of the pipeline ROW for operation and maintenance purposes shall be coordinated with nearby military installations, e.g., Edwards AFB, in order to avoid potential conflict.

153. Select the pipeline route to avoid populated areas, from both a land use and public safety perspective. In particular, the following areas shall be avoided if possible:

- The residential areas near Henderson and East Las Vegas, Nevada, can be avoided by selection of a route such as the primary route proposed by Kern River. The North Las Vegas Variation avoids this area. The Henderson Variation bypasses some of the residential area but not all. The staff has already recommended use of the North Las Vegas Variation.
- The route through Bakersfield shall be carefully selected to avoid or minimize impact on areas zoned residential or recreational.

3.2 ADDITIONAL MEASURES FOR WHICH THE AGENCIES ARE SEEKING COMMENT

The following additional mitigation measures have been suggested to the FERC staff for adoption in the FERC's Certificate of Public Convenience and Necessity. The staff is not prepared to recommend these measures at this time but would like input from the public. The reviewer is specifically requested to comment on the need, appropriateness, and feasibility of the following measures:

A. Require water be supplied for antelope pasture isolated during the construction period.

B. Where disturbance of habitat suitable for species of special concern cannot be mitigated, the applicant purchase an equitable area of suitable habitat to compensate for habitat lost. If the purchased land is of poorer quality than the habitat lost, then an appropriately larger tract of land must be substituted. Instead of purchasing an equitable tract of habitat, the applicant may deposit an appropriate sum of money in a land bank (e.g., local chapter of the Nature Conservancy) that would then purchase and manage a tract of suitable habitat.

C. On slopes greater than 25 percent, mulch, riprap (where appropriate) and water bars spaced every 50 feet be used.

D. All stream banks be riprapped.

E. Mowing of the ROW after construction be prohibited.

F. Chiseling be used in all range land areas to reduce compaction and improve soil permeability; pitting and contour furrowing on steeper slopes of disturbed areas to increase infiltration and to reduce runoff and erosion.

G. Rock mulches be used in steep-sloping rock outcrop areas and low precipitation areas to reduce erosion and promote vegetation growth.

H. Cultivation and land preparation operations on steeply sloping areas be done on the contour to minimize erosion.

I. On federal lands, indigenous trees and shrubs be re-established in areas as specified in the revegetation section of the FS/BLM COM plan. As directed by the FS/BLM temporary and/or permanent structures be installed by the company(s) at specific locations along the ROW and other disturbed sites to prevent off-road vehicle access.

J. The applicant adhere to the latest State Oil Hazardous Spills Plan/directory. The applicant(s) would develop a hydrocarbon spill prevention, control, and countermeasures

plan, following the guidelines established within the corresponding State Plan/Directory. This plan would address a) notification of appropriate agency personnel, b) actions that would be taken to detect and stop spills, c) methods of collection and removal of the spill, and d) follow-up treatment of residual hydrocarbons in the environment. The plan would include state-of-the art techniques for containment and clean-up of appropriate size classes of discharges included in the governing state's Oil and Hazardous Spills Plan/Directory. The use, design and deployment of the techniques would be specified by water course and land use areas in the plan. Containment, removal, and disposal techniques would require prior approval and authorization of the land management agency. (Specific comment is sought with respect to the applicability of an Oil and Hazardous Spill Plan to a natural gas pipeline project.)

K. If access or land management constraints preclude standard construction methods on federal land, the applicant be directed to use helicopters to string pipe, deliver equipment, or perform other phases of construction.

L. The applicant prepare a plan to minimize visual impacts from structures. If required, the applicant would prepare photographic simulations of areas in which facilities are proposed within foreground-middleground areas of high scenic value or sensitivity. Using the simulation as a guide, the applicant would design and locate the pipeline route and ancillary structures to blend into the existing environment.

M. The Topock Maze, a Native American intaglio, be avoided during construction and operation.

N. Wetland and riparian vegetation impacted by construction or operation be replaced in kind.

O. Proposed pipelines not cross Havasu National Wildlife Refuge (see discussion on page 1-20 of Volume III).

P. Field surveys for federal candidate species _Cymopterus deserticola_ and _Chorizantle spinosa_ be conducted.

Q. Joshua trees be avoided. Trees that are unavoidable be removed and transplanted if under five feet in height and, if over five feet in height, knocked down and encouraged to resprout adjacent to the ROW.

R. In Nevada, sales of Joshua trees, cactus, and other plants used for landscaping be conducted prior to construction. Sales would not be conducted in the summer. Processing of the sale would begin at least three months prior to construction.

S. For Air Force Flight Test Center (AFFTC) lands, the applicant conduct cultural and paleontological survey coverage to BLM Class III standards for a 1,000 foot wide corridor (previously surveyed areas may be omitted). The applicant complete all cultural and paleontological work in accordance with AFFTC general and specific stipulations as discussed in Cultural Resource Impact Mitigation Information and General Stipulations, Edwards AFB, Ca.

T. El Dorado monitor for public safety during construction through the Stoddard Valley Open Area.

U. Kern River realign its route to avoid visual impact approaching Rainbow Basin National Landmark on Fossilbed Road north of Barstow. The route should instead follow Fort Irwin Road proceeding west on the south side.

V. If construction of Transwestern Loop A takes place between March 1 and May 15, measures be implemented to avoid abandonment of lambs by ewes.

W. Transwestern Loop D be routed north and east of the Griego Limestone Pit in the eastern half of S20, T11N, R9W.

X. Northwest Rangely Loops be routed along Rangely-Dragon Trail Road.

Y. In areas of sand dunes in the Carlsbad Resource Area, blade land properly so that the pipeline is not buried within the dunes. Bury the pipeline a minimum of 30 inches below the original surface (before ROW grading and leveling activities) so that subsequent wind action does not expose the pipeline.

Z. Within the BLM's Carlsbad Resource Area, paint all aboveground facilities sandstone brown and periodically maintain them in accordance with federal standard 595-20318 or 30318.

AA. The pipeline project should be limited to a 50-foot ROW overlapping Transwestern's existing ROW's MN-070224 and MN-8722 with ditch lines not more than 20 feet off of existing ditch lines. If extra construction width is necessary, it will be held to a maximum of 200 feet confined to the southwest side of the ditch line between the compression station and the New Mexico Potash Company tailings and on the northeast side between New Mexico Potash and the tie-off point.

BB. The proposed Transwestern pipeline be routed on the northeast side of the existing pipeline from the Transwestern Compressor Station to just before the New

Mexico Potash Company Inc., mine tailings and on the south of this point.

CC. Require confirmation that Transwestern has coordinated with the New Mexico Potash Company Inc., to ensure that 1) subsidence from potash removal will not impact the proposed pipeline, and 2) that the most feasible route is developed either through or around the potash tailings and settling ponds. Any new routes will be evaluated, archaeologically cleared, etc., prior to authorization.

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